THE IRON TRADE REVIEW

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THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

Indications now point to an early settlement of the steel strike. According to Pittsburg advices, President Shaffer has been instructed by the executive committee of the Amalgamated Association to negotiate for peace on the best terms obtainable, and it is probable that the strike will be settled on the terms offered by the United States Steel Corporation last week. They provide for the signing of the scale for all the plants of the American Tin Plate Co., except those that have been placed in operation since the strike has been declared, and the Monessen plant; the signing of the scale for all the mills of the American Steel Hoop Co. that were signed for last year, and the signing of the scale for all the mills of the American Sheet Steel Co. that were signed for last year, except the mills that were placed in operation non-union during the year, and those that have been placed in operation since the strike was declared. This does not include the W. DeWees Wood plant, located at McKeesport, Pa. Disaffection in the ranks of the Amalgamated Association resulted in the resumption of operations at the Bay View plant of the Illinois Steel Co. this week, and reports from Joliet, Ill., point to an early resumption at that plant, unless the strike is immediately settled. The Demmler plant of the American Tin Plate Co. at McKeesport, Pa., was successfully placed in operation last week, and preparations are now being made to operate the Monongahela tin plate mill at Pittsburg. Activity on the part of the strikers this week not only prevented a general resumption of operations at the McKeesport plants of the National Tube Co., but the departments that were placed in operation last week were again shut down. The blast furnace workers affiliated with the American Federation of Labor, employed in the two Valleys, have formulated a demand for the operation of the furnaces with three turns instead of two. That the operators will refuse to concede this, is a foregone conclusion; but as a number of demands made by the workers during the past year have been successfully adjusted, a strike at the furnaces is considered a remote possibility. Heavy contracting for rails for delivery next year, by some of the leading railroad interests, fixes the price for standard sections for 1902 delivery at $28 per ton. The placing of these contracts fully two months earlier than last year has added great strength to the market. From the Cleveland district the placing of a contract for 5,000 tons of rails by a Western Ohio Traction Co. is reported. Receipts of ore at the lower lake ports during the month of August amounted to 3,602,005 tons, as compared with 2,911,622 tons during the same month last year, showing an increase of 690,383 tons. This large increase during the past month has greatly reduced the shortage in receipts, amounting to 792,969 tons on August 1, as compared with the receipts during the same time last year; and on September 1 the shortage in receipts amounted only to 102,586 tons. This increase in shipments last month is very encouraging, and the indications are that the receipts during the present month will greatly exceed those during the same month last year, and that the total season's receipts will greatly exceed those of last season despite the late start in shipments. The condition of the plate market continues to increase in strength daily, and at the meeting of the plate manufacturers held last week at New York it was decided to continue present quotations Several of the large plate interests report that the tonnage placed during the past week greatly exceeded the shipments, and the output of nearly all the plate mills for the next two months is already booked. From Chicago it is reported that the inquiry for Southern iron for the first half of next year is large, and the placing of contracts for a large tonnage of Southern iron at an early date is predicted. Sales of small lots of Bessemer iron in the Pittsburg district are reported at $15.60, delivered. That the United States Steel Corporation will not purchase Bessemer iron for delivery this month is now almost an assured fact, while the blowing in of two additional furnaces of the Carrie group at Rankin, Pa., within the next three months, will further reduce the amount of Bessemer and basic iron now purchased in the open market.

PITTSBURG.

OFFICE OF *The Iron Trade Review*,
429 PARK BUILDING, Sept. 11.

The acceptance of many large rail contracts from the leading railroad interests of the country during the past week by the various rail manufacturers at $28 per ton, practically fixes this price for standard section rails for delivery throughout the year 1902. The railroads are covering their rail requirements earlier this year than ever before, and within the next 30 days it is probable that the bulk of the steel rail business for the next year will be placed. It is stated by railroad officials that, owing to the large amount of new construction mapped out for next year, together with the relaying of many of the Southern and Western roads with heavier rail sections, the tonnage required next year will exceed the output of the rail mills this year. In addition to the large contracts already placed the rail manufacturers report that they are receiving many inquiries daily from roads all over the country, which would indicate that the railroads will place their rail contracts much earlier than in former years.

The iron and steel market has been greatly strengthened by this activity in steel rails and it is predicted by manufacturers generally that next year promises to be a prosperous one for the iron and steel trade.

Great efforts were made during the past week to settle the steel strike, and the United States Steel Corporation presented the Amalgamated Association excellent terms, providing the struggle would be immediately terminated. As yet the terms have not been accepted, but the indications are that they will be, as President Shaffer has been instructed to settle the strike by the executive committee of the association, and he will doubtless settle on the terms offered, when he learns that no better terms can be secured at this late date.

The Demmler tin plate plant at McKeesport, Pa., was placed in operation last week, nearly half of the former employes returning to work, and it is probable that the plant will be operating in full before the end of the week. The output of the plants of the American Steel Hoop Co. in this city, which were closed on account of the strike and subsequently re-

opened with non-union men, is increasing daily and all the mills are now operating double turn.

In finished lines the market continues strong, especially so in structural material, steel bars and plates. A meeting of the plate manufacturers was held in New York last week at which the general plate situation was canvassed, this being the first monthly meeting held since June. All the manufacturers reported that the business on hand was satisfactory and some of the larger mills reported from five to six weeks' business on hand. No change was made in prices.

Finished products affected by the strike continue to rule high, the premiums on tin plate and merchant pipe being much higher than those on sheets, owing to the greater number of mills affected in the former two lines. Tin plate continues to be held at $6.50 to $7 per box by jobbers, while jobbers in merchant pipe and casing have advanced prices during the week fully 5 per cent over those quoted last week, carrying with them advances of 25 to 35 per cent. The pig iron market rules fairly active, although the Bessemer market is very quiet and is inclined to be weak.

PIG IRON.—What little iron was not shipped from the furnaces in the valleys to the plants of the United States Steel Corporation on contracts placed in July, is now being shipped and within the next few days all the bessemer and basic iron contracted for by the United States Steel Corporation for delivery during the month of August will be shipped. There is little indication at present that any iron will be purchased this month and the requirements in October will be greatly reduced, as a third of the Carrie furnace group will be blown in, while the fourth of these monster stacks will be blown in during the following month. While the nominal price of bessemer is $16, Pittsburg, sales of small lots have been reported during the week at $15.60 per ton, and it is probable that large orders could be placed at $15.50 per ton. Forge iron is also inclined to be weak and sales have been reported at $13.55 to $13.75, Pittsburg. We note one sale of 3,000 tons for delivery to April 1 at $13.55. There is a fair demand for foundry iron and the sales of the week are estimated at 4,000 tons. No. 2 is held at $14 to $14.25 per ton. We revise quotations as follows:

Bessemer, Valley	$14 85 to 15 25
Bessemer, Pittsburg	15 60 to 16 00
No 1 Foundry	14 75 to 15 00
No. 2 Foundry	14 00 to 14 25
No. 3 Foundry	13 50 to 13 75
Gray Forge, Pittsburg	13 55 to 13 75
Chilled Basic, Valley	14 50
Chilled Basic, Pittsburgh	15 25

STEEL.—Steel billets for spot shipment continue to be quoted at $25 per ton and only an occasional carload lot is procurable. Bessemer billets, 4x4, for delivery during the months of November and December, can be secured at $24 per ton. Open-hearth billets are held at $25.50 to $26 per ton. The Cambria Steel Co. at present is selling a considerable output of billets in this market, and by the first of the year the company's output of this product for sale in the open market will be greatly increased. Rods are quoted at $34 to $35 per ton.

FERRO-MANGANESE.—Sales of domestic manganese, 80 per cent, are limited to small lots only. Carload lots, delivered at buyer's mill, are quoted at $55 per ton. Foreign manganese is quoted at $53.50 per ton.

SPELTER.—There has been no change in the spelter market and demand continues only fair owing to the idleness of so many galvanizing plants, due to the strike in the sheet mills of the American Sheet Steel Co. We quote prime Western grades at 3.95c, Pittsburg.

MUCK BARS.—Demand for muck iron for spot delivery continues good and sales of several 100 ton lots are reported at $31 per ton.

SKELP.—Premiums continue to be paid by independent pipe and tube manufacturers for skelp for spot shipment. There is little buying for future delivery, however. Iron skelp for delivery within the next two months, both grooved and sheared, is quoted at 2c to 2.05c, while steel skelp is held at 1.90c to 1.95c. For prompt shipment premiums ranging from $2 to $3 per ton are paid.

RAILS AND TRACK MATERIAL.—Several of the leading railroad interests of the country placed contracts for steel rails for delivery next year, during the past week. The contracts were placed at $28 per ton and the acceptance of so large a tonnage not only by the largest rail producer but by the various other rail manufacturers of the country indicates that this will be the ruling price throughout the next year. The railroad requirements this year will be greater than in previous years and the tonnage to be placed will be sufficiently large to insure the operation of all the rail mills of the country throughout the entire year. Figures showing the exact tonnage placed could not be secured, but it is reliably stated that at least one-fifth of the tonnage required by the railroads of this country next year has already been contracted for. Contracts for track material for delivery next year are also being placed, and from the inquiries being received daily it is evident that the railroads will cover their requirements of track material within the next two or three months. We make the following quotations: Standard sections, 50 pounds and over, in lots of 200 tons and over, $28; car lots and less than 200 tons, $30; less than car lots, $32; light rails, 8 pounds, $45; 12 pounds, $38; 16 pounds, $35; 20 pounds, $34; 25 to 40 pounds, $32. Track material: Spikes, 1.95c to 2c; track bolts, square heads, 2.40c; hexagon heads, 2.55; fish plates, 1.50c to 1.60c.

PLATES.—A meeting of the plate manufacturers was held in New York last week and the entire situation was carefully canvassed. All the manufacturers at the meeting expressed themselves as being satisfied with the present condition of the market and the outlook for future business was reported very bright. No change was made on quotations, which are as follows: Tank plate, ¼-inch thick up to 100 inches in width, 1.60c at mill, Pittsburg; flange and boiler steel, 1.70c; marine, ordinary firebox, A. M. B. A. specifications, 1.80c; still bottom steel, 1.80c; locomotive firebox, not less than 2.10c; and it ranges in price to 3c. Plates more than 100 inches wide, 5 cents extra 100 pounds. Plates 3-16 of an inch in thickness, $1 extra; gauges Nos. 7 and 8, $3 extra; No. 9, $5 extra. These quotations are based on carload lots, with 5 cents extra a hundred pounds for less than carload lots. Terms, net cash in 30 days.

BARS.—Some of the large manufacturers of steel bars in this district are completely filled up until the first of the year and cannot promise deliveries except on very small lots until after the first of the year. Despite the heavy tonnage placed during the summer months the demand continues good and a number of large contracts for delivery until next April have been placed during the week. Steel bars in more than carload lots for future delivery are quoted at 1.50c, while small lots are held at 1.55c to 1.60c. Iron bars are held at 1.50c, while refined bars continue to be quoted at 1.75c and upwards.

PIPES AND TUBES.—The striking tube workers at the McKeesport plants of the National Tube Co. this week successfully thwarted an attempt to place several departments of the plant in operation. The scarcity of certain sizes of merchant pipe is very pronounced and premiums ranging from 25 to 35 per cent above the prices quoted by the National Tube Co. are being offered and paid for special sizes. Jobbers' stocks in all sections of the country continue to grow smaller daily, and as the stock piles decrease, the premiums asked increase. The National Tube Co. is taking business for future delivery, but is not promising deliveries. On business for future delivery the National Tube Co. makes the following discounts to consumers, Pittsburg, in carload lots:

MERCHANT PIPE.

	In carloads. Blk.	Galvd.	Less than carloads. Blk.	Galvd.
⅛ to ⅜ inch and 11 to 12 inches	59.2	46.2	54.9	40.6
½ to 10 inches	66.7	53.3	61.9	49.9

BOILER TUBES.

	22 Feet and under. Per cent. Iron.	Steel.
1 to 1¾ and 2¾ to 5 inches, inclusive	43½	65½
2 to 2½ inches, inclusive	43	60
6 inches and larger	53	59

CASING.

	S. and S. Per cent.
2 to 3 inches	58
3¼ to 4 inches	63
4¼ to 12¾ inches	65

O. D. PIPE.

	Per cent.
14 to 22 inches	42
4 inches, o. d. and larger	37

THREADS AND COUPLINGS.

	Per cent
¼ to 16 inches o. d.	35

SHEETS.—Deliveries on the heavier gauges of black sheets

by the mills of the American Sheet Steel Co. continue to grow better every day and every effort is being made to increase the output of the lighter gauges. Black sheets for spot shipment continue scarce and independent manufacturers and jobbers quote 4c for No. 28 gauge and 3.75c for No. 27 gauge. The premiums asked on the heavier gauges are not nearly as high, however. Independent mills quote 3.35c for black sheets, No. 28 gauge, for future delivery while the American Sheet Steel Co. continues to make the following quotations on all business for future delivery: On lots in 500 bundles or more of black sheets, one pass through cold rolls: Nos. 10, 11 and 12, 2.30c; Nos. 14 and 15, 2.40c; Nos. 16 and 17, 2.50c; Nos. 18, 19, 20 and 21, 2.60c; Nos. 22, 23 and 24, 2.70c; Nos. 25 and 26, 2.80c; No. 27, 2.90c; No. 28, 3c; No. 29, 3.15c; No. 30, 3.25c. On lots less than 500 bundles the American Sheet Steel Co. will not make shipments except through jobbers, and for direct shipments from mill in less than carload lots an extra charge of 10 cents per 100 pounds is made. Galvanized sheets are held at 70, 10 and 5 off in lots of 500 bundles and over, and at 70 and 10 in smaller lots. Galvanized sheets for spot shipment are held at 65 and 5 off.

STRUCTURAL MATERIAL.—Several contracts for structural material for delivery early next year were placed during the week. None of the mills can make deliveries on new business short of four months and the situation continues very strong. Prices continue unchanged as follows: Beams and channels, 3 to 15 inches, 1.60c; 18 to 24 inches, 1.70c; tees, 1.65c; zees, 1.60c; angles, from 3 to 6 inches, 1.60c; universal mill plates, 1.63c.

WIRE AND WIRE NAILS.—At a meeting of the cut nail manufacturers held last week it was decided to advance the price 5 cents per keg. This advance in price is due both to the big demand for cut nails and also to the recent advances in cut nail stock by all the mills rolling this product. Demand for wire nails also continues strong. Wire products are also in big demand and jobbers report that they are meeting with considerable difficulty in keeping up their stocks on account of the crowded condition of the wire mills. We revise quotations as follows: Single carloads of wire nails to jobbers, $2.30, Pittsburg, to retailers, $2.40; plain wire, carload lots, is quoted at $2.25 to jobbers and $2.35 to retailers; painted barb wire, $2.60 in carload lots to jobbers, and $2.70 to retailers; galvanized barb wire, $2 in carload lots to jobbers, and $3 to retailers. Cut nails have been advanced to $2.05, Pittsburg, in carload lots, 2 per cent off in 10 days.

MERCHANT STEEL.—Owing to the recent reductions in the price of shafting buying has been greatly stimulated and many large buyers have placed their orders during the past week, who have been waiting for some time for these concessions. Our quotations are as follows: Turned, cold rolled and ground shafting at 60 per cent off for car lots and 55 per cent off for less than car lots; tire steel in carload lots and over, 1.60c, less than carload lots, 1.75c to 1.80c. Toe calk is held at 1.70c in large lots, and in small lots as high as 1.85c. Tool steel is held at 7c and upwards, according to quality.

OLD MATERIAL.—Demand for old material continues fair with little change in prices. We make the following quotations: Heavy melting stock, $15 to $15.50; low phosphorus melting stock, $16.50 to $17.50; steel rails, $15.50 to $16; bushleling scrap, $13 to $14; No. 1 wrought, $16 to $17; iron rails, $18 to $19; cast borings, $6.50 to $7; cast scrap, $13.50 to $14.

COKE.—For the week ending Saturday, August 31, there was another big slump in the production of coke amounting to nearly 12,000 tons. The production for the week was estimated at 207,399 tons. The coke situation is growing stronger and in neither the Connellsville nor the mountain district is much coke being carried in stock. Connellsville furnace coke is quoted at $1.75 to $2 per ton, while foundry coke is held at $2.15 to $2.40 per ton. Outside furnace coke is held at $1.40 to $1.65 per ton, while foundry is quoted at $1.90 to $2.15.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
934 MONADNOCK BLOCK, Sept. 10.

As we predicted last week, the strike in the western mills of the United States Steel Corporation is being called off by the men themselves. At a meeting of the employes of the Bay View plant, at Milwaukee, held last Sunday, it was voted, by secret ballot, to return to work, and the company being informed of this action, the fires were lighted Sunday night and the plant started up the following morning. Only half of the striking members of the Amalgamated Association connected with this plant voted to call the strike off, the remainder bolting the meeting. An early abandonment of the Amalgamated Association and its cause is now looked for on the part of the Joliet strikers, a large proportion of whom have never heartily been in favor of the strike, having allowed themselves to be overruled by the enthusiasm of the younger members. The resumption of work at the Bay View mills, at which bar iron was one of the principal products, will relieve the stringency of the market in this material, and the abandonment of the strike at Joliet will also aid in putting prices of billets, wire rods and other finished products back to their former level.

Repeated breaks are also being made in the ranks of the striking molders in this city, small numbers of the men daily returning to work. The National Founders' Association has been very successful in securing molders from out of the city to take the places of strikers, and also in inducing the conservative element of the local unions to return to work. Only a few of the more rabid members continue on strike, and these keep up the struggle, probably knowing the determination of the local foundrymen not to take them back at any price.

The machinists' strike still drags on, the local unions having concentrated all their efforts in the hope of keeping idle the shops of a certain large machinery manufacturer in this city. In this attempt, however, the unions have been unsuccessful, a sufficient number of machinists having been secured to operate all departments.

With the termination of labor troubles, the buying of iron and steel becomes less erratic. Ever since the strikes commenced, consumers have bought material in sufficient quantities to meet immediate requirements, preferring to pay higher prices to contracting over a period fraught with so many dangers of a sympathetic strike. This has passed, and it is now possible to perceive signs of order and symmetry in the purchase of both raw and finished materials. There is a decidedly better tone to the pig iron market this week than for some time past. This is particularly true with all grades of Southern iron. Most Southern furnaces are well stocked up with business for several months ahead, and consequently prices are very firm. The inquiry for delivery of iron extending into the first six months of next year grows daily, though there is very little buying covering this period being done. Small orders for prompt shipment still predominate, the total tonnage being very large. In finished iron and steel, there is no change in the situation from that reported for several weeks. Quick delivery is required by all buyers, and these are perfectly willing to pay the price demanded by the manufacturer or jobber.

PIG IRON.—Though most of the buying during the week just closed was confined to car load lots, immediate shipment being demanded in all cases by the consumer, there was a heavy inquiry for delivery during the first six months of next year. Southern irons are exceptionally strong, due to the fact that nearly all the furnaces have sufficient orders on hand to tax their entire capacity for several months ahead. Several orders for Southern iron went begging this week, owing to the inability of furnaces to guarantee the delivery required. Several large orders for Northern and malleable irons have been booked, but in total tonnage they do not represent the aggregate tonnage of orders for carload lots. Prices are very firm, with the prospect of an early increase in Southern irons. We quote as follows:

Lake Sup Charcoal	$17 50 to $18 00	Southern Coke No. 4	$13 90 to $14 15
Local Coke Fdy. No. 1	15 50 to 16 00	Southern No. 1 Soft	15 40 to 15 55
Local Coke Fdy. No. 2	15 00 to 15 50	Southern No. 2 Soft	14 90 to 15 15
Local Coke Fdy. No. 3	14 50 to 15 00	Southern Silveries	15 45 to 15 50
LocalScotchFdy. No. 1	15 50 to 16 00	Jackson Co. Silveries	17 00 to 17 50
LocalScotchFdy No. 2	15 00 to 15 50	OhioStrong Softeners	16 50 to 17 00
LocalScotchFdy. No. 3	14 50 to 15 00	Alabama Car Wheel	21 00 to 22 00
Southern Coke No. 1	14 65 to 15 15	Malleable Bessemer	16 00 to 17 00
Southern Coke No. 2	14 15 to 14 65	Coke Bessemer	17 50 to 18 50
Southern Coke No. 3	14 15 to 14 65		

BARS.—It is practically impossible for consumers to secure prompt delivery of material, as most of the mills have sold all they can manufacture. Contracts for long time delivery are becoming more numerous, and as an indication

that the United States Steel Corporation regard the settlement of the strike near at hand, is the fact that it is now booking orders. There are one or two inquiries in the market for 1,000-ton lots of steel, while business in small lots continues up to the past average. We quote steel bars for immediate shipment, 1.70c, Chicago, and iron, 1.65c, Chicago. Out of store, steel, 1.90c; iron, 2c; on contracts for large lots and extended deliveries, steel, 1.55c; iron, 1.60c.

SHEETS.—Consumers find themselves still unable to get all the material they would like. Mills continue behind in shipments and stocks in warehouse are rapidly diminishing. Prices are irregular, varying according to jobbers' stock on hand. We quote No. 27 black, 4.10c to 4.25c, and galvanized, 60 per cent and 5 per cent from store.

STRUCTURAL STEEL.—With mills several weeks behind in deliveries, jobbers are doing an excellent business and getting good prices. There is a plentiful supply of small orders, with several large contracts being figured on. Jobbers are asking 50 cents, 75 cents, and $1 higher than mill quotations, Chicago delivery. We quote mill shipments, carload lots, as follows: Beams, 15 inches and under, 1.75c; 18 inches and over, 1.85c; angles, 1.75c to 1.80c; plates, 1.75c, base; tees, 1.80c; zees, 1.75c; small lots from store, ¼c higher; beams and channels from store, ½c to ¾c per pound higher.

RAILS.—A large inquiry for rails is reported for delivery early next year, and there is considerable inquiry also for smaller lots for delivery this year. All the local manufacturers of light rails and track supplies are sold for several months ahead, and buyers experience trouble in getting any material for quick delivery. Our quotations follow: Standard rails, $28; light sections, $33 to $35, according to size; out of store, $40 to $44; splice bars, 1.60c to 1.70c; spikes, 1.90c to 2c; out of store, 2c; track bolts, hexagon nuts, 2.80c to 2.90c; out of store, 2.90c to 3c; square nuts, 2.65c to 2.75c; out of store, 2.75c to 2.85c.

MERCHANT STEEL.—Mills are becoming so full of work that some report they cannot make shipments inside of three to four months, and are instructing their agents to take no large orders without first submitting them to the home office. Business is in equal proportions to that of past weeks. Our quotations follow: For mill shipments, Chicago delivery, smooth finished tire steel, 1.90c to 2c; open-hearth spring steel, 2.50c to 2.75c; toe calk, 2.40c to 2.60c; sleigh shoe, 1.85c to 1.90c; cutter shoe, 2.40c to 2.60c; ordinary tool steel, 6c to 7c; specials, 13c and upwards. Cold rolled shafting, carload lots, 55 per cent and upwards.

PLATES.—All the mills in this locality are well stocked with orders, and owing to the difficulty of giving consumers the shipment desired, much business is being deflected to jobbers' channels. We quote as follows: Tank steel, base, ¼ inch, 1.75c; flange steel, 1.90c to 2c; marine steel, 1.95c; firebox steel, ordinary, 2c to 2.10c; special, 2.25c and upwards. Tank steel from store, 2c to 2.20c; flange steel from store, 2.25c.

MERCHANT PIPE.—There is no change in the situation from that noted in our last report. Most jobbers are out of stock on some sizes, and consumers find some difficulty in getting material. Prices are practically arbitrary, according to the stock the merchant has on hand. We quote manufacturers' prices, random lengths, as follows:

	Black Per cent.	Galv. Per cent
½ to ⅜ and 11 to 12 in	52	37
¼ to 10 inches	60	46

OLD MATERIAL.—There is a better demand for scrap iron and prices are firmer. Relaying rails, busheling scrap, turnings and borings find ready buyers. We revise our prices as follows:

Old iron rails	$20 00 to $20 50	Old Wheels	$16 00 to $16 50
Old steel rails, long	16 00 to 16 50	Heavy melting steel	13 00 to 13 50
Old steel rails, mixed	13 50 to 14 00	Mixed country steel	10 00 to 10 50
Relaying rails	24 00 to 25 00		

The following are selling prices per net ton:

No. 1 R. R. wrought	$15 00 to $15 50	Iron axles	$20 50 to $21 00
No. 2 R. R. wrought	13 00 to 13 50	Cast borings	4 00 to 4 50
Dealers' forge	12 50 to 13 00	Wrought turnings	10 00 to 10 50
No. 1 busheling	10 50 to 11 00	Iron axle turnings	11 00 to 11 50
Heavy cast	11 00 to 11 50	Steel axle turnings	9 50 to 10 00
Railway malleable	12 00 to 12 50	Stove plates	7 50 to 8 00
Country malleable	10 50 to 11 00	Old iron splice bars	16 00 to 16 50

WIRE AND WIRE NAILS.—The local interest reports that it is now in position to take better care of orders for barb wire than for some time past. Business continues excellent from all parts of the country, and jobbers' prices remain firm. Our quotations follow: Carloads of wire nails to jobbers, $2.40, Chicago; to retailers, $2.50; plain wire, carload lots to jobbers, 2.35, to retailers, 2.45; painted barb wire to jobbers, carloads, $2.70, to retailers, $2.80; galvanized barb wire, carloads to jobbers, $3, to retailers, $3.10.

CLEVELAND

OFFICE OF *The Iron Trade Review*,
1064 ROSE BUILDING, Sept. 11.

One of the encouraging features of the week has been the report of the iron ore movement during August, which has but recently been issued by the shippers. It shows that during August there were received at the principal Lake Erie ports 3,602,005 tons of iron ore. During August, 1900, the movement amounted to 2,911,622, showing therefore an increase for the month of August this year of 690,383. The figures are surprising when it is recalled that during that month a car shortage was noticeable which prevented any large direct movement from the boats to the stock piles of the furnaces. The report also shows that the total shipments to September 1 was 12,263,436 tons, as against 12,366,022 tons up to September 1, 1900, showing therefore that the shippers are still 102,586 tons behind what they were a year ago. Even this shortage is encouraging when it is considered that at the opening of August the shippers were 792,969 tons behind the movement to that same date a year ago. While the shortage has not been entirely wiped out, as some hoped, the shippers have come so near to it as to practically have accomplished their purpose. The present pace being maintained during the month of September will permit the shippers not only to catch up with last year's movement but also to make certain gains which are counted upon to increase the total shipment of this year past what was reached a year ago. In fact, some shippers are looking for a total movement for the season of 1901 of more than 20,000,000 tons, notwithstanding the fact that the season was delayed six weeks at the start. The good showing is the beneficial effect of the increase of the ore-carrying tonnage and is in a large measure due to the fact that the other trades have not demanded that the ore trade divide tonnage with them during the summer.

PIG IRON.—The pig iron trade has been a little quiet during the week. This was shown especially in the sale of foundry grades, in which alone has any activity been seen during the last few weeks. The orders have continued to come in in small lots, but without any contracts being noted during the week. The buying has been on the hand-to-mouth order and on all sales immediate delivery has been requested. The furnaces are still behind with their orders and the business has hardly slackened enough to permit them to catch up, in consequence of which deliveries are not promised very promptly. The prices have not changed in the least, as No. 2 is still being quoted variously at $13.50 and $13.75 at the furnace, some sales having been made at both figures. No transactions in basic have been reported during the week and in that respect the market is a little quiet. The only quotations which are made therefore are nominal, but they hold at $15 at the furnace, at which price the last orders were taken. The demand for Bessemer is at the minimum now and most of the material which is being produced is going into stock. No new contracts are made upon which the material may be shipped and but little business in this line is expected until the final outcome of the strike of the Amalgamated Association is known. The nominal quotations are still $15.25, Valley furnace, and producers show no disposition to shade that price to get business. The quotations hold as follows:

Bessemer	$16 00	Valley Scotch No. 1	$14 50 to $14 75
No. 1 Strong F'dry	14 50 to 14 75	Valley Scotch No. 2	14 00 to 14 25
No. 2 Strong F'dry	14 00 to 14 25	Gray forge, Valley	13 00
No. 3 Foundry	13 75 to 14 00	LakeSuperior charc'l	17 00 to 17 50

FINISHED MATERIAL.—The week has shown a continued interest in the supply of sheets and bars, but with no relief in sight. The producing capacity has not been added to and as that which is now active has been sold up for some time to come the buyers are dependent entirely upon the stocks for their supply. In sheets especially this is the case and even the stocks are becoming limited. While this is true there is no disposition to change the prices any. The quotations on sheets remain therefore as follows: No. 28 at 3.95c; No. 27 at 3.85c; No. 16 blue annealed at 2.90c; No. 12 blue annealed

at 2.60c. These prices govern the sales out of stock. On bars the prices hold now as formerly quoted at 1.50c on steel bars and from 1.52½ to 1.55 for iron bars, with sales out of stock being made at 1.72½c to 1.75c, respectively, on steel and iron bars. The demand for steel rails has continued to be as heavy as formerly noted, and this week has seen a sale of 5,000 tons to the Western Ohio Traction Co., the order having been taken by the Carnegie Steel Co. The price holds at $28, at which figure sales covering deliveries past the 1st of January are being made. The market has heard inquiries for quite a volume of business upon this basis. The extraordinary demand for structural shapes keeps up and the business this week has been brisk, new orders having been placed in addition to the heavy application on former contracts. Small angles are still very scarce and deliveries are not promised before November 1. The price holds firm at 1.70c.

OLD MATERIAL.—The scrap trade is a little quiet now, as most of the sales are in small lots. The price list does not change, quotations remaining as follows: Old iron rails, $19 to $20; old steel rails, $15 to $15.50; old car wheels, $16; mill scrap, $14 to $15; No. 1 machine scrap, $13.50 to $14; iron axles, $22; wrought turnings, $12 to $12.50; cast borings, $6.50; stove plate, $10 to $10.25.

CINCINNATI.

Sept. 10.

There is a feeling of strength in all branches of the iron trade induced by a steady demand and by a rather low condition of stocks and, as far as finished material is concerned, a limited production. Nearly all manufacturing lines are busy and are expecting to be in the market for material. Machine tool concerns, engine builders and all special lines are increasing their demand for castings. The carriage manufacturers have had a lockout of their employes for some time, but have decided to attempt to go ahead. If they succeed in getting started with non-union labor they will be actively in the market for their needs. Some trouble between the foundrymen and the molders came up the past week but was settled, as was the more serious trouble of a fortnight ago. When the first strike was settled the floor molders were of the opinion that an old custom in Cincinnati that on "hot days," that is, days when the blast is on for big work, the labor of the molders ceases when the blast goes on, unless they have something to pour. When the settlement was made this concession to the molders was withdrawn and they were not supposed to be through for the day even when the blast did go on. The bench molders were not affected, but the floor molders threatened to have the entire battle fought over again. It was settled without this, however, the foundrymen agreeing to allow the old order to stand.

PIG IRON.—The market for pig iron holds firm, though there have been no advances from previous quotations. Orders are plentiful but are not for large lots, ranging mostly from carload lots to 500 tons. The orders are not confined to any grade, but are scattered pretty well through the list. It looks as though buyers were not impressed with the belief that they will make anything by putting off buying, though they do not as a rule show as much confidence in the market as to place very large orders for delivery very far ahead. Most of the business taken by the iron men is for early delivery, though it is scattered all through the remaining months of the year and beginning of next. The large number of orders, though they are not record-breakers in size, has resulted in a large total tonnage.

Following are prices for Cincinnati:

Southern Fdy. No. 1	$13 50 to $14 00	Northern Fdy. No. 1	$15 00 to $15 25
" " 2	13 25 to 13 50	" " 2	14 50 to 14 75
" " 3	12 50 to 13 00	Charcoal C. W. iron	18 00 to 18 50
" " 4	12 00 to 12 50	Malleable coke iron	15 00 to 15 25
So. Fdy. No. 1 soft	13 50 to 14 00	Gray Forge mottled	12 00 to 12 25
So. Fdy. No. 2 soft	13 00 to 13 50		

FINISHED MATERIAL.—Conditions unite to make the market for finished material strong. The continued good demand, together with the inability of mills and handlers to furnish material on immediate delivery on some kinds of output, have firmed up prices on some and put a premium on others. The mills are now expressing some fear that the market will get away from them and go to two cents on bars. If this should happen they think that the menace of some of the mills in the far east will show itself and this, together with the probability that the steel strike will be settled before long, will cause the market to break. It is this combination of circumstances that they do not want to face. Many of the mills are filled up with orders placed at the present figures or lower and they are anxious that the market be kept about steady or at least not go much higher. Mills are not taking orders for plates and sheets if they can help it, and some of them are refusing any business in these lines. Prices quoted are about the same as last week, as follows: Iron bars, 1.65c base; steel bars, 1.60c to 1.65c base; angles, 1.85c to 1.90c base; plates, 1.85c to 1.90c; sheets, No. 28, 3.35c to 3.40c; sheets, No. 12 blue annealed, 2.05c to 2.10c. The prices quoted on plates and sheets are mill prices here if the buyer is willing to wait till he can get them. Prices out of store on No. 28 sheets are about 3.90c to 4c, and No. 12 blue annealed about 2.70c. There is a noticeably good demand from manufacturers for bars. One concern in Cincinnati has been offered a contract for 3,000 tons of bars, which would fill up the bar iron mill for some months. It has not as yet been closed.

OLD MATERIAL.—The market for scrap has been almost unchanged from what it has been recorded for the past fortnight. Prices quoted are as follows:

Old No. 1 wr'ght R.R.	$14 00 to $14 50	Old iron axles	$18 50 to $19 00
Cast mac & fy. scrap	12 25 to 12 55	Old iron car wheels	16 75 to 17 00
Old iron rails	17 50 to 18 00	Stove plates	9 75 to 10 00
Old steel rails	14 75 to 15 00	Wrought turnings	10 00 to 10 25
Old short lengths	13 50 to 13 75	Cast borings, net tons	6 75 to 7 00

It is rather a hard matter to get quotations on some of these articles. The prices represent the cost to the purchaser, not the price for which the first hands can sell, but even then some of the scrap is offered at lower figures than currently reported. For example a lot of old iron axles was offered during the past week at $15, and wrought turnings were offered at $8. The market price at which the stuff can be bought is as quoted.

PHILADELPHIA.

Sept. 10.

The strongest feature of the market is the scarcity of material for early delivery. Consumers have practically only covered their requirements a few weeks ahead, and what will be needed during the balance of the year will make a sufficient volume to greatly sustain present prices for some time to come. Individual opinions differ as to the future. Buyers are figuring on a shading of prices for next year's deliveries, though little encouragement of this view is being given them by sellers.

PIG IRON.—Although a fair degree of activity is to be noted there is no great pressure to either buy or sell. The policy of only covering requirements for sixty or ninety days is being adhered to by purchasers. On the other hand sellers have sufficient orders on their books to take care of their product, and are under no obligations to make concessions. From all appearances considerable business will be done before the end of the month at curent quotations, which for Philadelphia and vicinity range about as follows: No. 1 X foundry, $15.50 to $16; No. 2 X foundry, $14.85 to $15.25; No. 2 plain, $14.25 to $14.75; standard gray forge, $13.75 to $14; ordinary gray forge, $13.25 to $13.50; basic (chilled), $14 to $14.25.

FINISHED MATERIAL.—A good demand exists for all forms of finished material, with prices fully maintained. It is the generally expressed opinion that the immediate future will witness no material change. Stocks are depleted to such an extent that a long time will be required to replenish them. Buyers are inclined to make only short time purchases, leaving long time contracts for further consideration. The demand for plates and bars does not appear to be as urgent as a short time ago, although prices are very steady, averaging about as follows for seaboard and nearby deliveries: Plates, ¼-inch and thicker, 1.75c to 1.80c; bars, iron or steel, 1.62½c to 1.70c; angles, 1.75c to 1.85c; beams and channels, 1.75c to 1.80c.

OLD MATERIAL.—A languid appearance is apparent in old material, and unless there is an early demand a slight shading of prices is likely to follow. The following quotations are for delivery in buyer's yard: Choice railroad scrap, $17.75 to $18.50; No. 1 yard scrap, $13.75 to $14.25; No. 2 light scrap, $12 to $12.50; machinery cast, $13.75 to $14.25; heavy steel scrap, $16 to $16.25; old iron rails, $18.50 to $19.50; old steel rails, $16.50 to $16.75; wrought turnings, $11.50 to $12; cast borings, $7.25 to $7.75; old car wheels, $16.50 to $17; old iron axles, $22 to $23.

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G. H. GARDNER, President and Treasurer.
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A. I. FINDLEY, ... EDITOR.
ROBERT I. CLEGG, . . . EDITOR MACHINERY DEPARTMENT.

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THE ATTACK ON PRESIDENT McKINLEY.

The attack upon President McKinley has roused intense sorrow throughout the nation. His personal character has been of so honorable and blameless a type that the antagonists of his policies have invariably tempered opposition with hearty appreciation of his amiable qualities as a citizen and a man. No ruler of other lands has enjoyed in greater measure the regard and confidence not only of his fellow citizens but of the people elsewhere, and it is the common hope and prayer that his life may be preserved to us; that our country may continue to receive the service of his lofty patriotism and devotion.

Let not the solicitude with which we await the tidings of his progress blind us to the query as to how far we have done our individual duty. We are a democratic nation and it has seemed perfectly in consonance with that faith that we should have ready access to the President at all public meetings, unmindful of the fact that this very intimacy has increased the opportunity of the assassin. Respectful regard for the President of the United States can be exemplified without the wearisome handshaking that has so long been a custom at his public receptions. This democratic tendency, furthermore, has caused us to ignore the growth of a sentiment that rails at all government and we have sheltered those to whom liberty is but the synonym of license. Anarchy has indeed been the recipient of encouragement from this very indifference, whilst the complacency with which some newspapers caricature and libel citizens of repute is a constant menace to law and order. Many misguided perverts are prone to think such statements are the veritable expression of the popular belief and there smoulders in their degenerate minds a spark that may blaze into an outburst like the one at Buffalo. Anarchy is an avowed foe to the permanency of the State; it is an act of treason that for the public weal should be curbed. We have no lack of regard for the freedom of the press nor any intention to unduly limit the democracy of a free and sovereign people. It is rather the desire for a curtailment of these conditions that have lengthened and embittered the controversies between employer and employed, as well as the hope that there may be fewer opportunities for a repetition of the work that brought to an untimely end the invaluable services of Garfield and Lincoln. There are manifest limits even to the liberty of the press; fortunately the press is amenable to popular opinion and it is devoutly to be hoped that general sentiment will set its emphatic disapproval upon much of the inflammatory material that has so long been current in certain newspapers.

THE PERSONAL ELEMENT IN CONSOLIDATIONS.

Two things among others were predicted as the working out of the personal factor in connection with iron trade consolidations. One was that the wiping out of minor companies, and the reduction of many who had been captains to lieutenancies would soon result in a large crop of competing companies, led by such of these men as could not be satisfied in positions with little or no initiative. Another prediction was that apart from the formation of independent companies there would be little opportunity for young men to rise in the iron trade. What has turned out has been quite different in both instances from what was prophesied. In wire manufacture there are two conspicuous instances in which men prominently identified with companies absorbed by the American Steel & Wire Co. have put capital into new enterprises in the same line. The crucible steel industry has another example, and there is a noteworthy one in tin plate. In other lines there are scattering cases, but none in which especially heavy investments were made or in which the tonnage of any individual competitor would make it an important factor.

In scores of instances officers or directors in companies taken into the consolidations have apparently retired from the business, having only the relation of stockholders to the one great company that early in the present year absorbed the absorbers. Not a few of these men were at the retiring age and sought no new responsibility. Others who might have gone into active business again were deterred by agreements that bound them to stay out for a term of years, and still others felt that in view of the concentration of control of raw materials, the possibilities of changes in the industry itself and in general business conditions, and the length of time required to build any considerable plant, they might well be satisfied with the price of their retirement from ownership and management. The building of works to sell to the consolidations has not developed into any great industry as yet. Two well-known plants built in the past two years have been sought after and attractive terms have no doubt been offered, but independent operation was preferred.

On the score of opportunity for advancement under the regime of consolidation we take it there has been far less ground for complaint than most opponents of the new order had anticipated. The most noteworthy fact in this connection is the number of resignations of executive officers of the iron and steel consolidations. In some cases these were due to the friction resulting from the bringing together of incompatible elements. In others the strain of the duties necessarily devolving upon a few in whipping into shape a huge aggregation of properties soon wearied the bear-

ers of these new responsibilities, particularly as the change had made many of these men millionaires who had never had expectations of entering that class. And more recently the merging of consolidations in the United States Steel Corporation has brought a series of changes that would seem to augur more for the rise of young men from the ranks than anything that has yet appeared. It may mean that the age of retirement will come earlier than heretofore in iron manufacture. The number of iron masters in the fifties now on the retired list would seem to point that way. But one thing the recent changes particularly suggest; that is, that the Carnegie policy of putting young men to the front in the years of their best efficiency, when the stimulus of ambition is strongest, is to be the policy of the great corporation to which the Carnegie company contributed the first president. In all the subsidiary companies most of the men who are now in places of largest responsibility have come into prominence in the past two or three years. The new directory of the iron and steel trade of the United States soon to be issued will contain many names that had no place on the official list of the more than 100 companies that went to make up the subsidiary corporations of the big company. It may be that under the new regime a short life and an intense life will be the rule for the men who make history in the iron trade, but it means also that the rule of change will bring forward the men who have an aptitude for leadership, whether in operating, sales or accounting departments. For men of conspicuous ability we believe it may be said with truth that greater opportunities never existed than are presented today.

A LAW TO ENCOURAGE "PICKETING."

The board of aldermen of Paterson, N. J., by a unanimous vote has gone on record as one of the first, if not the first, of municipal bodies to declare picketing a lawful act. The ordinance proceeds as follows:

Section 5. That any person or persons who shall in any street or public place in the city of Paterson make, aid or assist in making any improper noise, riot or disturbance or breach of the peace, or shall behave in a disorderly manner, or shall make use of obscene language or profanity, curse or swear, and all persons who shall collect in bodies or in crowds for idle or unlawful purposes shall each be subject to a penalty of from one dollar to twenty-five dollars for each and every such offence, or to imprisonment in the public jail at the rate of one day for each and every dollar of said fine. Provided always—that nothing in this section contained shall be construed to prohibit or punish "picketing" by a labor union or its members in a lawful and peaceful manner, and said picketing shall not be considered a disorderly act within the meaning of this section.

Picketing is easily defined. It may be but the presence of one or more strikers on the streets in the neighborhood of their former place of employment. The mildest form of interference may be offered by a striker. The effort to coerce the employer and his workmen can be purely verbal and devoid of harshness, yet if it exercise a species of intimidation that works upon the mind, it becomes a criminal conspiracy. There may be no public disturbance, no physical injury, no direct threat or personal violence, or actual attack on or destruction of tangible property as a means of intimidation or coercion. Nevertheless, the clear weight of authority is undoubtedly that a man may be intimidated into doing, or refraining from doing, by fear of loss of business, property or reputation, as welll as by dread of loss of life, or injury to health or limb. And the extent of this fear may be only such as to overcome his judgment, or to induce him not to do, or to do, that which otherwise he would have done or refrained from doing. Judge Wing, in making his decision in the United States Circuit Court, in the case brought by the Otis Steel Co., Ltd., of Cleveland, against striking members of the Iron Molders' Union, held that picketing was one of the union's methods of enforcing its unauthorized mandates, namely, to the non-union workmen, "You shall not work for the Otis Steel Co.," and to the company, "You must not proceed with your business and the operation of your plant, unless you comply with the conditions we have imposed. Asked by attorneys for the strikers to define "picketing," Judge Wing aptly answered that it is "the establishment and maintenance of an organized espionage upon works and upon those going to and from them."

Judge Hammond, in one of his decisions, states that "in this country freedom to contract in business is a constitutional freedom which not even State Legislatures can impair," and the municipality of Paterson under its charter can not claim greater power than the source from which it derived its authority.

The evident intention of the framers of the ordinance is sufficiently plain, nor does there seem to have been any misunderstanding on the part of the many spectators who appeared at the meeting at which this ordinance was considered, judging from the newspaper account. There are, however, certain indications in the drafting of the document suggesting something of the nature of a practical joke. Have the members of the aldermen's board exercised a little ante-election diplomacy in this treatment of their constituents? The last clause in Section 5, if it means anything, means that lawful picketing shall not be prohibited, nor shall it be considered disorderly. As the courts of last resort have not recognized the existence of "lawful picketing" and the two terms in the light of recent decisions are incompatible, the labor unions cannot derive much comfort from the production of their aldermanic friends. They have received permission to attempt the impossible and the permit has been adorned with all the empty formality that would have gladdened the heart of Dogberry himself.

Personal.

A. A. Straub of Pittsburg, Pa., has been appointed real estate agent of the H. C. Frick Coke Co., with headqarters at Scottdale, Pa. He will have charge of all matters pertaining to taxes, assessments, etc.

J. H. Bitz, superintendent of the Empire & Humphrey plants of the Bessemer Coke Co., has been transferred to the Griffin works of the same company in the Masontown coke regions in Pennsylvania.

George M. Hunter has been appointed superintendent of the Youngstown, O., plant of the American Bridge Co., to succeed E. M. Scofield, resigned.

An account filed with the Pittsburg courts last week of the value of the estate left by the late James Hemphill, places its value at $1,437,851.43. Of this amount more than $800,000 is in cash, while the remainder consists of stocks and bonds.

Mr. J. B. Murphy, secretary of Crane Co., Chicago, has returned from his trip to Europe.

PROGRESS OF THE STEEL STRIKE.

PITTSBURG, Sept. 10.—President Shaffer of the Amalgamated Association has been given full authority to settle the steel strike by the executive committee, which was in session here for three days. It was decided not only to give Mr Shaffer full authority to settle, but he was further instructed to sue for peace as son as possible and to accept the best terms offered.

Last week officials of the United States Steel Corporation consented to meet a conciliation committee consisting of President Gompers of the American Federation of Labor, John Mitchell, president of the United Mine Workers, and a number of other labor leaders who have interested themselves in the settlement of the strike. After a brief conference terms were secured upon which a settlement of the differences could be immediately adjusted. These terms were immediately communicated to President Shaffer and the members of his advisory board located here. President Gompers and others urged President Sahffer to accept the terms. They were urged, especially as it was believed that the Association would be able to save something out of the wreck if an immediate settlement were made. President Shaffer, however, stated that he would not indorse the acceptance of the terms, but would call a meeting of the executive committee for the purpose of considering them. No time limit was placed upon their acceptance by the United States Steel Corporation, despite reports to the contrary, and the executive committee convened last Friday. On Monday afternoon the committee adjourned and the various district vice-presidents returned to their homes. Before returning they informed President Shaffer that they would report to the various lodges located in their respective districts that the settlement of the strike is now in the hands of the president of the Association, and that unless a settlement is made they stated that they would urge the lodges to return to work in the idle mills on the best terms obtainable. Such a move would mean the disintegration of the Association, and President Shaffer has been in communication with New York all day trying to secure somewhat better terms than were offered last week. The terms, however, will remain unchanged and the longer the peace negotiations are carried on, and the more mills started with non-union men, the less the Association will be able to save when a final settlement is brought about.

The terms of peace provide for the signing of the scale for all the mills of the American Tin Plate Co., except the Star, Crescent, Irondale, Demmler and Monessen mills. By these terms the Association would lose four mills that have been placed in operation since the strike was declared. The terms also provided for the signing of the scale of all the mills of the American Steel Hoop Co., which were signed for last year. This would lose to the Association the Painter, Clark and Lindsay & McCutcheon mills located here, and the Monessen plant, at which lodges have been formed since the strike was declared. All of these mills have been placed in operation successfully since the strike was declared, however, and are now operating with non-union men. The terms also included the signing of the scale for all the mills of the American Sheet Steel Co. signed for last year, with the exception of the Old Meadow, Cambridge, Saltsburg, Hyde Park and Canal Dover mills, which are now operating non-union. This offer would also exclude the W. DeWees Wood plant, which was only organized this year by the Amalgamated Association.

While the Association would lose a number of mills, no better terms could be expected in view of the fact that the United States Steel Corporation is gaining ground daily.

One of the severest blows that the Association has received since the strike was inaugurated was administered by the majority of the Association members employed in the Bay View plant of the Illinois Steel Co. on Sunday, when it was decided to return to work. The plant was accordingly placed in operation on Monday morning and will soon be operating in full. The men employed at the Joliet, Ill., plant of the Illinois Steel Co. are also considering the advisability of returning to work within a few days if no settlement is announced. The men at Bay View have returned to work under the terms agreed to about a month ago, just before they were ordered out by President Shaffer.

The Demmler tin mill of the American Tin Plate Co. at McKeesport is operating six mills and will soon be operating in full. Tthe Monongahela plant will also be placed in operation within a few days. A demonstration by more than 2,000 strikers at McKeesport on Monday morning prevented the resumption of operations at the tube plants of the National Tube Co., and the departments opened last week have not yet been able to resume this week, owing to the violence threatened all who return to work before a settlement is made.

The Crescent tin mill at Cleveland, O., is on in full, nearly all the former employes having returned to work.

Late Strike Developments.

(Special Telegram.)

PITTSBURG, Sept. 11.—Developments in the steel strike situation today are more favorable for the United States Steel Corporation, whose efforts to start idle plants is causing uneasiness among the workmen.

President Shaffer disclaims any insinuation that he was asked to resign or contemplates resigning, and reiterates his declaration that the strike will be fought to a finish. The situation in the various strike centers shows gains for the steel corporation. McKeesport plants are being put in operation and an increase in the force at Demmler is admitted.

Preparations are under way to put the Painter plant on double turn and the Lindsay & McCutheon hoop plant is holding its own. The Star tin plant is operating six mills, and an attempt will be made to start up the Monongahela tin plate plant.

Demand Shorter Hours.

(Special Telegram.)

PITTSBURG, Sept. 11.—It is reported from Youngstown, O., that the employes of the Mahoning and Shenango Valley furnaces, now organized under the American Federation of Labor, have demanded that three turns be employed on the furnaces instead of two. This would mean a reduction in the working hours from 12 to 8 hours per day.

Late Pittsburg News.

(Special Telegram.)

PITTSBURG, Sept. 11.—The annual meeting of the stockholders of the Youngstown Iron, Sheet & Tube Co. was held at Youngstown, O., yesterday. It was unanimously decided to increase the capital stock $1,000,000, making the total capitalization $2,000,000. It was decided to erect an open-hearth plant. Officers were elected as follows: Col. George W. Wick, president and treasurer; James A. Campbell, vice president and general manager.

H. C. Reymer petitioned for a receiver for the Star Enameling and Stamping Co. of Allegheny yesterday. He is a creditor for $8,000 and owns $12,000 stock. Alleges insolvency. Many notes are out and no funds are on hand. He states, however, that the business can be conducted profitably and ultimately clear itself. He places liabilities at $44,000 and assets at $80,000. The concern was formerly the Star Dinner Pail Co. Present charter was secured two years ago with $65,000 capital stock. The concern makes tinware and enameled ware.

The American Bridge Co. has been awarded the contract for erecting the buildings for the Pittsburg Steel Co. plant. More than 2,500 tons of material will be required in their erection. The main building, in which will be located the wire and nail departments, will be 1200x170 feet; the galvanizing and barb wire building will be 800x120 feet; rod mill, 350x190 feet; cooperage department, 200x90 feet; boiler house, 450x60 feet; machine shop, 250x70 feet, and the electric plant, 70x40 feet.

As a result of the bi-monthly examination of the sales sheets of the Republic Iron & Steel Co. the puddlers employed in all their mills affiliated with the Amalgamated Association will receive an advance of 25 cents per ton for the months of September and October. For the months of July and August they received $5.25 per ton, but as the sales sheets showed an average selling price of bar iron of 1.40c, they will receive $5.50 per ton during the next two months. The finishers will receive an advance of 2 per cent.

THE TAYLOR-WHITE PROCESS OF TREATING TOOL STEEL AND ITS INFLUENCE ON THE MECHANIC ART.

The following paper by Mr. Charles Day was read before the Franklin Institute and is reprinted from the *Journal*. It points out in vivid language the modern trend of shop practice and the impetus given to the rate of production by any effective means to profitably change the breaking-down point of cutting tools. The Taylor-White method is intended to accomplish just such a revolution and the address of Mr. Day is exceedingly interesting, as showing what has been done in engineering establishments other than the birthplace of the process. The address follows:

I have been asked to give you this evening, a brief description of the Taylor-White process of treating tool steel, with special reference to our work at the Link-Belt Engineering Company (Nicetown, Philadelphia).

I will first take up the process, which has been but recently patented here and abroad. The first experiments, which led to the very thorough investigation later, and finally to the Taylor-White process, were carried out between three and four years ago at the Bethlehem Steel Works (South Bethlehem, Pa.) by Messrs. Taylor and White. At that time "Mushet" and "Jessop" tool steels were in general use throughout their shop, the former representing the best grade of air-hardening steel on the market. The usual method of hardening all air-hardening steel is well known, and the manufacturers in nearly every case place great stress on the fact that the tool must not be heated above a cherry red, otherwise it will be burnt, and so ruined. Not being satisfied with the limited information at hand on this matter, and having had some curious experiences with so-called burnt tools, Messrs. Taylor and White decided to make an investigation of the matter on a thoroughly scientific basis.

Many grades of air-hardening steel have been on the market for several years, and for roughing work have unquestionably replaced the carbon variety, the efficiency of the former ranging from one and a half to twice that of the latter. This gain is due to the fact that air-hardening steel holds its cutting edge at much higher temperatures than carbon steel, and consequently can be worked at proportionately greater cutting speed. The object in view in carrying out the experiments above referred to, was to obtain a tool steel which would give still better results than those already obtained, and how successfully this end has been attained is only too well known by those interested in machine-shop work.

The experiments consisted essentially in a long series of tests made upon tools of various chemical compositions, and heated to different temperatures. These tools, after being carefully ground to the desired angles, were tested in an experimental lathe, provided with a motor drive and an "Evans" friction cone, in order to obtain any desired cutting speed. Most careful records were made of all these tests, which extended over several years. The results which were finally arrived at, and recently patented, are truly astonishing, the treated tools showing an efficiency ranging from one and one-half to two and one-half times that of air-hardening steel treated by the old method.

The discovery of the new process depends largely on the fact that, although both carbon and air-hardening steel deteriorate rapidly when the temperature rises above a cherry red, some chemical compositions of the lattetr class rapidly pass through this condition, the efficiency rising slowly at first, and very rapidly as the temperature rises, reaching a maximum at the point where the tool crumbles when tapped with a rod.

The point to which air-hardening steel was formerly heated in the process of hardening was between 1,550 degrees F. and 1,600 degrees F., and has been called the "breaking down point," and varies, as do the other points, with different compositions of steel. The composition found to give the best results consists of an air-hardening steel containing at least ½ of 1 per cent chromium and 1 per cent or more of another member of the same group, tungsten being found to give the best results. Much better results are obtained, however, by using about 1 per cent of chromium and about 4 per cent of tungsten; while for very hard metals, such as the chilled scale on cast iron, etc., 3 per cent of chromium and 6 or more per cent of tungsten are especially good. It may be interesting to note that the variation in carbon seems to matter but little, steel varying from 85 to 200 points giving equally good results.

The method of cooling the tools from the "high heat" about 2,000 degrees F.) plays a very important part in the process. Although there are many ways of cooling, each one being adapted to certain classes of tools, they may be described generally as follows: the tool is cooled rapidly from the "high heat" to a point below the breaking-down temperature in a lead bath, and then slowly in the air, or lime, etc., as the case may be. It is very essential that at no time the temperature should rise, as in such a case the tool would be seriously impaired. After the steel has cooled off, its efficiency is found to be further increased by subjecting it to what is termed the "low heat" for about ten minutes; this temperature ranging from 700 degrees F. to 1,240 degrees F. After cooling from the "low heat" the tool is ready for use. In order to obtain the best cutting edge, at least 1-16 inch should be ground off the tool, as the surface is more or less deteriorated by the high heat. The surface of special tools can be protected, however, by some form of flux, thus making it possible to treat milling cutters, etc., by this process. The treatment in all cases extends well back from the point of the tool, and permits of its being ground until so weakened as to require reforging. It is not essential to anneal the steel when reforging, and it might be well to add that all these tools can be worked with comparative ease.

In the operation of the Taylor-White process apparatus is employed by means of which temperatures can be controlled within very narrow limits, which accounts for the uniformity of results obtained with the tools treated by this process. It has been found necessary to modify the treatment of the special steel used in this process in order to obtain the best results under different condition, such as varying kinds of metal cut on different types of machines, such as lathes, planers, slotters, drill preses, etc., so that no less than ten different modifications of the treatment are used in the preparation of tools for a large and fully equipped shop working on different kinds of metals and with various classes of tools. The variations required, however, in the treatment are of the most simple and easy application after once being understood, and can be handled with the full degree of success by an ordinary trained laborer.

This apparatus offers the still further advantage of hardening and tempering all classes of carbon steels, such as ordinary tempered tools, taps, reamers, milling cutters, etc. By careful operation of the process the best temperatures at which to harden and temper are soon learned, which will insure a uniformity never before attained in these tools.

The very brief description which I have just given, is but an outline of the Taylor-White process, the details of which are most interesting, representing, as stated above, the results of the most thorough scientific investigation. It was particularly fortunate that this discovery was made at the Bethlehem Steel Company's works, where the facilities for carrying on the experiments were of the very best. If this had not been the case, in all probability the process would never have reached its present standard or uniformity. The latter quality is of the greatest value, as will be explained later, and is possessed by no other tool steel. Over 200 tons of steel forgings were cut up in carrying out this work, and the total cost aggregated about $100,000.

A better example could not be found of the modern methods adopted in attacking problems of this nature. They bring rich results in nearly every case. Any number of examples could be cited, but probably one of the most interesting, and, at the same time, richest results, was the work of Captain Jones on the ingot molds at the Edgar Thomson Works at Pittsburg. These molds, in nearly every case, cracked after a few ingots were cast, the expense this involved being enormous. Realizing the necessity of more durable molds, and learning from experience that some fulfilled the requirements much better than others, Captain Jones undertook an investigation on the lines we have referred to above, the results paying a handsome dividend on the entire plant. And so it is in every line of manufacture, that the concern which has the facilities and is willing to spend the necessary money for work, which, at first sight, often seems entirely unnecessary, makes strikes which

not only cheapen its own product, but affect the entire business world.

The Taylor-White process of treating tool steel is particularly of this character, and has already wakened up machine shops all over the country to the fact that methods frequently known as "good shop practice" are anything but *good*, and if they expect to keep up with the times they must adopt different plans and more radical methods.

It will now possibly be well to consider some of the savings effected at the Link-Belt Engineering Company's works since this process was introduced. The class of work in this company's machine shop being radically different from any encountered by Messrs. Taylor and White up to the time we adopted the process, the first few months were devoted almost entirely to experimental work, the steel having been in general use throughout the shops for only a couple of months. For this reason it is impossible to give any data extending over considerable time, but a few examples taken at random will convey a fair idea of gains we have made.

About 97 per cent of our material is cast iron, requiring much handling and relatively little machine work. In order to make a rough test on cast iron, one tool was obtained from Bethlehem and put to work on a 7-foot boring mill turning the inside of a cast-iron ring. The time required to do this work with our old tools had been determined many times in setting piece rates, and was about 14 hours. With the Taylor-White tool this time was reduced to three and one-half hours, and a gain of 75 per cent made. To be sure, the steel used heretofore was not the best obtainable, and, besides, was probably not worked to its highest efficiency, but the saving, nevertheless, was due to the Taylor-White process, and so it is that many shops of the best

was made in operations where it was possible to use treated tools.

The entire order of sheaves above referred to, many of which were small, the roughing cuts being but a small percentage of the machining, required 1,569 hours' work. This was a gain of 501¼ hours, or 31.95 per cent over our *best* previous records, and gives a good idea of what may be expected on work of this class.

Tools treated by this process are not intended for finishing, but rather for heavy cuts, where the tool is subjected to high heat. We have experimented quite a little with special tools, and have been very successful with boring cutters, the actual time for boring being reduced frequently 60 per cent. Here the tool saving is not as great as the figures would suggest, as the time to chuck a sprocket is at present often greater than to machine the same. The trouble lies in the design of the lathe that handles our sprockets, which we are at present remodeling in order to reduce the time of chucking, and similar operations to a minimum. A test made on boring cutters treated by the process shows conclusively their superiority for this work. It consisted in boring 1 3-16 inch standard solid collars in one cut, the core being one inch. The lathe was speeded up until the work at the point of the cutter was going 77 feet per minute. The regular cutter lasted but ten seconds, while the treated ones bored four (4) collars successfully.

In order to obtain some data with regard to pressure on the points of tools for given depths of cut, feed, etc., and at the same time to show the superiority of the treatment we are considering, a cast-iron ring 6 feet 6 inches in diameter was bolted to the table of a 7-foot boring mill and the results obtained tabulated below:

NO.	TOOL	MATERIAL	CIRC. SPEED		FEED		DEPTH	LENGTH CUT		POUNDS	AMMETER		VOLTMETER		HP		LBS. METAL PER HOUR	CONDITION TOOL	PRESSURE ON TOOL	
			IDLE	CUT	CALCULATED	ACTUAL	CUT	INCHES	MIN.	METAL	IDLE	CUT	IDLE	CUT	IDLE	CUT			ACTUAL	PER SQ. INCH
1	H.S.H. TREATED ⅞"·1¾"	C. I. SCALE	86	78	1/16	.056	.91	2 5/16	10	106	32	145	112	106	4.80	20.5	636	GOOD	6650	132,000
2	M.E.S.H. TREATED 1"·2"	"	86	77	1/16	.053	.91	1 5/8	7½	80	33	145	112	108	4.96	21.0	640	FAILED	6905	143,000
3	MUSHETT 1"·2" AIR HARDENED	"	86	—	1/16	—	.91	—	1	5½	33	110	112	109	4.96	16.1	—	"	—	—
4	M.E.S.H. NOT TREATED	"	86	77	1/16	—	.91	—	1 5/8	7	32	110	116	110	4.98	16.2	—	"	—	—
5	H.S.H. NOT TREATED	"	86	—	1/16	—	.91	—	2 5/8	19	32	110	116	110	4.98	16.2	—	"	—	—

TESTS MADE ON CAST-IRON RING 6 FT. 6 IN. DIAMETER. BORING MILL, NO. 191. LINK-BELT ENGINEERING COMPANY, NICETOWN, PHILADELPHIA.

standing could, after introducing this "process" and watching it with proper diligence in the shop, show savings considerably in advance of those claimed by the inventors. I do not wish to infer that there are not shops in existence who push every tool to its limit, but they are decidedly the exception.

Some interesting data was also obtained from an order of rope sheaves, the time required to do similar work having been tabulated for several years. The average time required to machine 13 sheaves with our old tools was nine and one-half hours, the same for 16 similar sheaves, the roughing being done by Taylor-White tools, was five hours and five minutes, or a saving of 46½ per cent. In order to obtain, however, a correct comparison of the relative merits of the tools used for roughing, it is necessary to analyze the various operations.

	Hours.
Setting up	.9
Forming groove with special tool	.5
Boring and polishing	.25
Roughing	3.43
	5.08

Assuming the time for setting up, forming, boring and polishing the same when sheaves were finished with old tools, the time for roughing would have been 7.85 hours. From these figures, we see that a saving of 56.3 per cent

The first tool used was one treated for hard material. It cut 106 pounds of metal in 10 minutes, and when removed was in perfect condition. A "Mushet" tool under the same conditions lasted but one minute, and removed 5½ pounds of metal. The actual pressure against the tool in each case exceeded 3¼ tons, while the pressure per square inch with the Me. S. H. tool was 143,000 pounds. Friction of the tool against the work was not considered in the above, and would vary the results somewhat.

We will now turn our attention to steel for a few moments, and although we have very little roughing work of this character I can recall several instances where good savings were effected, any one of which will serve as an example. One of our standard forms of internal screw conveyor is provided with steel tires about 40 inches in diameter and 40 points carbon. These are machined all over, the *best* time required for the entire operation of setting up, roughing, finishing, etc., etc., with our old tools being 14 hours; this was reduced to 9½ hours, or a saving of 32.1 per cent on the first order received after treated tools were in use. Our experience on steel has been so limited that we will take the liberty to quote some figures obtained at the Bethlehm Steel Works. The table given below shows the chips cut in pounds per hour per tool, the data extending over the time the experiments were being developed, and are con-

sequently, very interesting. A Taylor-White tool when working dry should cut blue chips continuously, so it is only necessary to turn off the water for a moment in order to see if the tool is working to its highest efficiency. The cutting speed may be increased about 30 per cent if a good stream of water is kept on the point of the tool. It may be interesting to some to know that the point of the tool is frequently red hot when cutting dry. This fact showing conclusively the high temperatures at which the cutting edge is retained.

We will now consider for a few minutes, the effect of this new process on machine tool design. I do not refer to very large tools and special machinery, which are usually built to fulfil given requirements, but to standard tools such as we find in every machine shop and which can be purchased from a large number of first-class concerns.

First, on account of the uniform results obtained by the Taylor-White treatment, it is possible to predict almost exactly what circumferential speeds should be used for any given material. To obtain close speed regulation with the cone method on such tools as boring mills, lathes, etc., requires multiple counter shafts, and is at best a poor rig where the work is small and the time of setting up and shifting belts a large percentage of the labor bill. A rope sheave, for instance, 5 feet 0 inches in diameter could be roughed out at 52 feet with the belt on the 26-inch cone, gears in, but this is found, from past experience, to be too slow. The next speed of 77 feet on the other hand would soon destroy the tool. In order to overcome this difficulty and for the many accompanying advantages, we have decided (at the Link-Belt Engineernig Co.'s works) to introduce the motor

Table Showing Increase of Cutting Speed, etc., in the Machine Shop of the Bethlehem Steel Company, Since the Introduction of the Taylor-White Process.

AVERAGE.	OCT. 25 1898	MAY 11 1899	JAN. 15 1900	GAIN IN % CUT OF 3" OVER 2"	GAIN IN % CUT OF 3" OVER 1"
CUTTING SPEED	8'-11"	21'-9"	25'-3"	16%	183%
DEPTH OF CUT	.23"	.278"	.30"	8%	30%
FEED	.07"	.0657"	.087"	32%	24%
LBS. METAL REMOVED PER HOUR	31.18	81.52	137.3	68%	340%
TENSILE STRENGTH	95,000	102,322	105,764*	3⅓%	11⅛%
% EXTENSION	.19%	.169%	.15%	8⅓%	
% CARBON	.44%	.42%	.42%		

*High tensile strength due to large amount of nickel steel being machined.

Average metal removed per hour, per tool (round nose) — 310 pounds, April, 1901.

drive. This work has just been started; the method adopted for speed regulation being the three-wire system, with rheostatic field regulation. After introducing the Taylor-White process at the Link-Belt works, it was found essential to speed up many of the tools on account of the high circumferential speeds which were made possible. On account of the variety of work handled and the fact that many tools do nothing but finish work, it was not practicable to increase the line shaft speed more than 30 per cent; the natural solution being motors; the machines becoming self-contained and permitting of any experimental work without shutting down the line.

As the machines were speeded up to obtain higher circumferential speeds, the power required to drive them idle was found to increase very rapidly, the limit of the line and engine being soon reached. An example may make this clear:

SEVEN-FOOT BORING MILL.

	Min.	Max.	Power Required to drive table at max. speed. Horse-power.
Original range of table speed.....	.5	17.26	10.00
1st change, increased 25 per cent.			
2nd "	.9	23.50	15.30
3rd "	1.28	33.8	23.00 (approx.)

Eighteen months ago a 50-h. p. Buckeye engine furnished power to about 40 of our machine tools, including three boring mills (10 feet, 7 feet, 6½ feet) our pattern shop and grinding room, the latter containing six carborundum wheels, four of which are frequently in use at one time. The average horse power developed has been determined frequently and averaged about 45. It required, however, about 27-h. p. to drive the line shafting and counters, thus leaving out 18-h. p. for actual work. After the new tools were in general use and the machines pushed to obtain the desired results, it soon became apparent that the power was absolutely inadequate; indicator cards from our engine frequently showed an overload of 60 per cent, and at this point we found it essential to put motors on some of our larger tools for the present, with the intention of using them entirely in the future as stated above.

Coming back to the machine tool manufacturers, it is quite remarkable how little many of them seem to know about the power required to drive their tools under varying conditions. How many builders can tell you the pressure on the tool for a given depth of cut; feed and speed for a given material on boring mills or lathes, yet how can they expect to design the tool correctly for power and rigidity if they have not this information? Why is the "power limit" so ridiculously low on many of our small machines, the spindle speed and feeds out of all proportion for the work they are expected to do? The answer is easy, the question has never been attacked, by most manufacturers at least, by the methods so well exemplified in the Taylor-White process or the Jones ingot mold. I recall an experience we had a few weeks ago while investigating some small drill presses, purchased in order to complete an order containing several thousand duplicate cast iron parts. The ones finally obtained gave a maximum spindle speeed of 290 revolutions. The Morse twist drill table calls for a speed of 214 revolutions per minute for a ⅝-inch drill in cast iron. We ran the same size drill at 290 revolutions per minute passing through a 3-inch hub in one minute and twenty seconds. We found it paid to grind up completely two twist drills in a 10-hour day on each drill press; the tool room force of course keeping the men supplied with sharp drills. It should be understood that the above twist drills were not treated, but the same as we have been using for years. If a ⅝-inch drill on a 24-inch drill press can be run at the maximum speed and feed obtainable, how can we expect to run the smaller sizes efficiently, and what, I wonder, does the manufacturer expect one to use the speeds for, obtainable with the gears in? We have found it possible to double the speed of all our drill presses, but this, of course, does not help the feed.

From the data obtained by Mr. Taylor, over a long period of years, it has been possible to obtain a relation between the circumferential speed, feed, depth of cut, and time element, and so derive an empirical formula, upon which data together with the details of any given tool, most ingenious slide rules have been formed. It is possible with these instruments (which are in practical use), to make out time cards from the blue-print and before any work has been done on the piece, showing the workman just where to put his belts and how to set his feeds and depth of cut for a given material in order to have the desired power, and at the same time remove the maximum poundage in order that the tool should last a certain pre-determined time. The time the tool should last being based on the time necessary to change the tool, and is expressed in the empirical formula above referred to. I merely mention the above facts to show how the tool designer of the future will be able to accumulate a store of information which will be the basis of all the work, and how widely the machine shop practice of the future will differ from that of the past. Probably you have all read Mr. Porter's article on "The Radical Policy of Scrapping Expensive Machinery." This policy applies just as well to small machine tools. In the majority of our machine shops, where all of the tools are relatively small, there is just as big a field for this radical policy as in our largest establishments.

My remarks up to this point have dealt with the relative merits of tool steel, and the great increase in the output possible, when the Taylor-White process is used. The question now arises, How are we to maintain this increased output throughout the shop? There is nothing new about driving machines to their power limit. I remember reading an article by Hiram Maxim on "Trade Unionism," where he quotes an old Scotch machinist, who told him when a boy, how to become a good machinist, namely, "to work the tool to the limit, to run on the belt, and always have a new tool ready to put in tool post, etc., etc." The average foreman is far too busy following up orders, etc., to look after the details of speed on individual machines, and no one else is in close enough touch with the work to give it the required attention. The only satis-

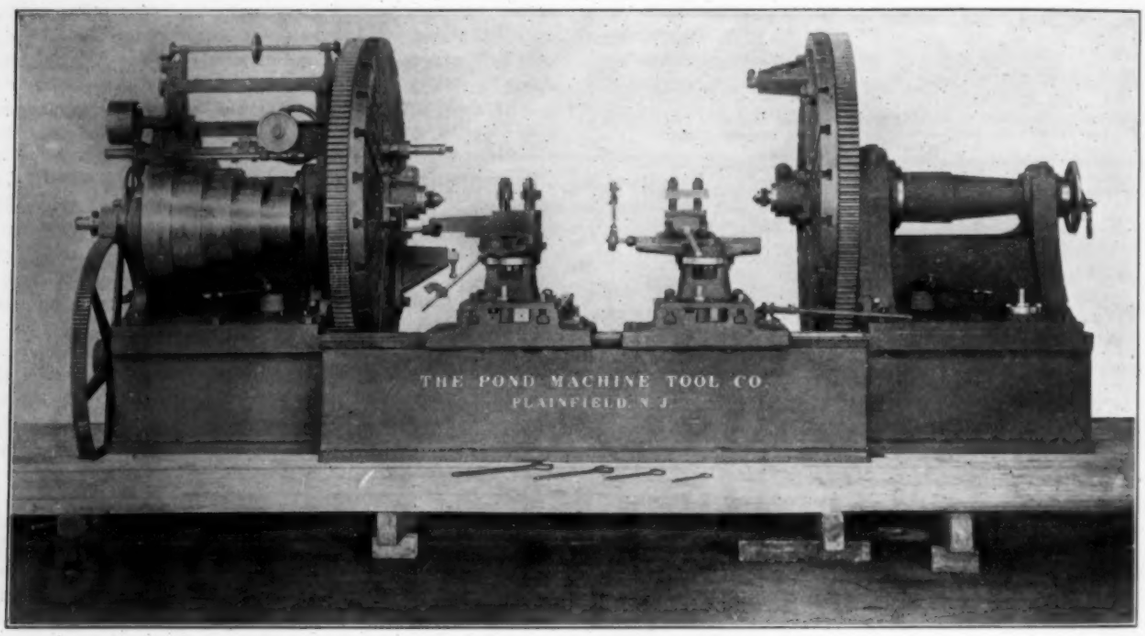
factory solution to the problem, where there are sufficient men to justify the move, is to appoint a speed foreman, who must be a man of considerable tact, in the beginning at least, in order to maintain the good will of the men. Production to the "tool limit" is but one of the many means to attain the end that all up-to-date concerns have in view, namely, to produce a better article at a cheaper cost. It has been well named the age of "intensified production," and extends to every branch of manufacture. Competition has become so severe, unless one makes use of every opportunity, he is soon driven to the wall.

The engineer of the present day has before him a tremendous field, the production of the best for the least money, involving a thorough knowledge of every branch of engineering, shop management, etc. The laboring man cannot stop the advance any more now than he could in the past, but as he is just as much a part of the whole, as the machine or tool steel, he should be just as carefully watched, his welfare attended to, his physical and mental conditions looked after, and, in fact, be made just as good a workman as possible. In many establishments the machinery is most carefully attended to, while the man who operates it, the keynote of the whole scheme, is ignored. The importance of this fact is now being realized by many concerns, much money being spent, money which will pay big interest, to add to the comforts and welfare of the employes. It should be clearly understood that nothing is offered in the way of a bribe or obligation, the effort being to make the surroundings such that the workmen are both physically and mentally stronger, and in a position to turn out more work unconscious to themselves. Methods like these will, I think, help the labor troubles considerably and facilitate the introduction of new ideas. Too much stress is placed on what a machinist is paid per hour, or how long he works by the time clock. These points are of but secondary consideration, the "work rate" being the true gauge. At the Link-Belt Works no fixed rate of wages is employed, the men being paid according to their merits. After the introduction of Taylor-White steel, it was essential to remove the piece rates from many standard operations, and in all such cases the policy of the company has been to divide the savings effected with the men. After the men knew that they would share the advantages derived from the new process, their whole attitude was different, and, in fact, what else could we expect.

In conclusion I wish to state that it was due to the courtesy of Messrs. White and Taylor that I have been able to present to you this evening the statistics and steel chips obtained at the Bethlehem Steel Co.

A NINETY-INCH DOUBLE LATHE.

The massive tool, illustrated below, will swing 91 inches and will turn wheels 85 inches on the tread. The face-plates are 90 inches diameter and may be driven together or separately, as desired, and at the same or different speeds. Each main spindle has an internal steel spindle with sufficient travel to clear the longest crank pins. The center line of the main spindles is carried backward so that the tool rests do not overhang the bed when turning wheels of largest diameter. The lathe bed consists of vertical walls, thoroughly united by cross girts. The front walls are carried up much higher than is customary, increasing the strength where the strain of cut is taken, also shortening and consequently stiffening the tool posts. The tool posts have compound and swivelling movements with variable and self-acting feeds at all angles by overhead rock shaft, driven by slotted hand wheels on ends of the internal spindle screws, which are so locked to the main spindles that it is impossible for the internal spindles to back out and allow the axle to become loose on the centers. The adjustable head can be moved on the bed by means of a pinion engaging in a steel rack. All gearing is cut. The face plate pinion shaft is of extra large diameter. The driving dogs are adjustable to different lengths of crank pins. Supports for internal spindles, countershaft and set of wrenches are provided. Single or double quartering attachment and journal turning attachment furnished when required. This tool is a recent production of the Pond Machine Tool Co., Plainfield, N. J.



NINETY-INCH DOUBLE WHEEL LATHE.

McCord & Co., Chicago, have issued a twentieth century catalogue, 4 x 6¾, of the McKim Gasket and McKim Seamless Copper Ferrules. The McKim Gasket is made of a special packing encased in a metal armor; various combinations of rubber or other elastic material with copper, aluminum or some soft-rolled metal. This combination gives strength and elasticity in a form capable of resisting heat, pressure and chemical action with a minimum tension on bolts and pinions. The armor not only prevents blowing out of the packing but is a preventative of the sticking that is so great a nuisance with many expansion joints: on this account the McKim Gasket can be used repeatedly. The catalogue contains much information in regard to the construction and sizes of gaskets and copper ferrules: these ferrules are made of pure Lake Superior sheet copper, double annealed and without seams. Many facsimile testimonials are incorporated in the catalogue testifying to the superior merit of the gaskets and ferrules manufactured by this company.

Efficiency Test of a Continuous Rod Mill.

Interesting data concerning the operation of a Morgan continuous rod mill are contained in the report of a two weeks' test conducted by Robert W. Hunt & Co., of Chicago, July 15 to 20 and July 22 to 27 inclusive, 1901. The object of the test was to determine the efficiency of the mill, namely, the amount of fuel used in gas producers and boilers, the amount of billets heated and weight of rods rolled, together with all data relating to operation. The condensed report follows:

Description of Plant.

The plant consists of a Morgan continuous rod mill, having 14 passes, six sets of rolls for roughing and eight sets for finishing. The mill is operated by a single cylinder, non-condensing Cooper Corliss engine. The cylinder is 34 inches diameter and 48 inches stroke. The roughing rolls are driven by gearing, and the finishing rolls by belting. The reels are also run from this engine. A Buckeye engine 10x18 inches supplies power to the air fan, dynamo, air compressor, pumps for supplying water to rolls and the rod conveyor. The rolls for charging billets into the heating furnace and to the mill, the feeding device on the producers, the turning lathe and drill press, and the scrap shears are also operated from this engine.

The furnace, which is directly behind the continuous mill has a bed about 15x32 feet set on a slope of one in six. The billets are charged at the upper side and pushed down by means of a ram operated by a steam cylinder. The air enters a space in the wall on the lower side of the furnace through ports left for that purpose. It is then drawn over the top of the furnace and enters the fan, which forces it into and through a heater surrounding the stack, and down through conduits, under the floor, into checker work and under the furnace floor. The heated air enters the furnace through cast iron boxes set in the wall at the lower side of the furnace. The gas from the producers enters the furnace through a flue under the floor and mixes with the air, the proper proportion being obtained by means of water cooled flat valves.

There are two Morgan gas producers, each fitted with the Bildt feeding device. The producers are 8 feet inside diameter and 12 feet high. They are blown by means of a steam jet of special form, which syphons into the producer heated air from under the furnace. This blast enters the producer at the center under a hood, and is regulated by a valve at the front of the furnace.

There are six horizontal tubular boilers, 72 inches x 20 feet, fitted with George grates, but during this test only five were used, as the other was cut off to supply steam for driving artesian wells.

Method of Testing.

The following observations were taken: 1. Weight and number of billets. 2. Number of billets not rolled into rods. 3. Weight, number and size of rods rolled. 4. Weight of mill scrap and finned ends. 5. Weight of coal used on producers. 6. Weight of coal used under boilers. 7. Indicated horse power of both engines. 8. Pressure of steam in boilers, gas in chamber and draft in stack. 9. Temperature of gas in chamber of heated air, and of flue cases. 10. Running time of mill and accidents and cause.

1. The billets used were uniform in size, 1¾x1¾ inches, and approximately 30 feet long. The billets were weighed in car load lots. Each car was carefully weighed, loaded and empty, on accurate track scales, and a careful count of billets in each car was kept. During the two weeks run, four different lots of steel were used, viz.: Bessemer and open-hearth steel from Illinois Steel Co. and National Steel Co., carbon ranging from .12 to .13.

2. A careful account was taken of all billets weighed and not rolled into rods.

3. The rods were weighed in trucks on a double beam platform scale. The number of bundles and the time of weighing was recorded. No. 5 rods were rolled throughout the entire run with the exception of four hours on Friday and Saturday morning, July 26 and 27, when No. 4 rods were rolled.

4. The mill scrap and finned ends were weighed separately, and after each turn, were cut up and disposed of. The finned ends were all cut off on the hot conveyor before the bundles were weighed. This work was carefully watched. The long pieces cut off by the knife at the end of the roughing mill, were saved and used as test pieces for the finishing mill, but the rod made was not long enough to save and was counted as mill scrap.

5. The coal used in the gas producers was weighed in wheel-barrows before it was wheeled up to the producer house, and was kept separate, for each producer. Samples were taken continually for chemical analysis.

6. The coal for the boilers was weighed in carload lots, and that which remained at the end of the week was weighed back. During the first week, only the coal necessary for running the mill was weighed, i. e., from 6 a. m., July 15, to 12 noon, July 20; but for the second week, the entire amount was recorded, i. e., the extra coal for banking fires, getting up steam, etc., or all the fuel used between noon July 20 to noon July 27. The coal used in the boiler house was Black Hill coal from Pawnee mines, Illinois.

7. Both engines were indicated at frequent intervals during the entire test.

8 and 9. Observations were taken every hour, as follows: a. Boiler pressure. b. Blower pressure for producer. c. Gas pressure. d. Temperature of heated air (at each end of furnace). e. Temperature of gas. f. Temperature of flue. g. Temperature of outside air.

The boiler pressure was read on the gauge of boiler No. 1 which was calibrated.

The pressure of gas was taken through an opening in the manhole covering of the chamber leading from the producers to the furnace. There was a draft at this point, but in the "down pipes" at the openings where the samples were taken, there was neither draft nor pressure. The temperature of the gas was taken through the manhole cover by means of a La Chatelier pyrometer. The temperature of the heated air was taken in two places. Holes were drilled through the cast iron boxes near each end of the side wall, thus avoiding the action of radiated heat. These temperatures were taken with both mercurial and La Chatelier pyrometers. The temperature and draft in the stack were taken at a point just above the air drum around the stack.

Data and Results.

GENERAL LOG.

	1st Week.	2nd Week.
Average boiler steam pressure, lbs	108.1	108.1
" gas pressure in chamber, ins	.014	.01
" draft in stack, ins	.013	.007
" temperature outside air, deg. F	80.9	76 9
" " gas in chamber	1130.	1210.
" " air back end of furnace	980.	950.
" " " front " " "	800.	890.
" " heated air, deg. F	890.	920.
" " flue gases	610.	595.

ACCIDENTS.

Date.	Working Time. Hrs.	Min.	Time Lost. Min.	Cause.
July 15th, Day turn	11	17	10	Broken billet.
			5	Cobbles.
			3	Reel stuck.
Night "	10	59	7	Broken billet.
			5	Cobble.
			4	Mess of rods.
			3	Cobble.
			4	Cobble.
July 16th, Day "	11	16	5	Broken billet.
			3	Cobble.
Night "	11	3	28	Broken coupling.
			4	Cobble.
			3	Cobble.
July 17th, Day "	11	6		
Night "	11	4		
July 18th, Day "	11	3		
Night "	10	55		
July 19th, Day "	11	7	12	Cut end from roughing mill got into finishing pass.
			8	Cobble.
			5	Cobble.
Night "	11	0	15	Cobble.
July 20th, Day "	5	49	10	Cobble.
Total	116	39	2-15	

July 22nd, Day turn	10	42	3	Cobble.
Night "	11	14	5	Cobble.
			6	Cobble.
July 23rd, Day "	11	10	6	Billet out of guides.
Night "	11	6	3	Rod thrown from guide pipe.
July 24th, Day "	11	6	4	Billet out of guide.
			3	Low steam.
Night "	11	7	45	Broken billet and broken Coupling.
			3	Cobble.
			3	Mess of rods.
July 25th, Day "	11	9	3	Billet messed.
Night "	10	56	10	Broken coupling.
			8	Cobble.
			12	Cobble.
July 26th, Day "	11	0	9	Cobble.
Night "	11	6		
July 27th, Day "	5	43	6	Mess from split billet.
			2	Cobble.
			9	Mess of rods.
Total	116	10	2-20	

DETAILS OF PRODUCTION.

(Week July 15 to 20 inclusive)

Time.	Billets Used. Lbs.	Rods. Lbs.	Mill Scrap. Lbs.	Finned Ends. Lbs.
July 15th, Day turn	178,530	172,415	1,485	935
Night "	189,180	184,890	1,170	1,125
July 16th, Day "	186,585	182,945	1,135	980
Night "	183,305	178,655	1,155	977
July 17th, Day "	192,575	189,190	405	1,053
Night "	194,595	192,385	719	903
July 18th, Day "	192 680	188,410	555	1,035
Night "	196,450	191,240	791	1,324
July 19th, Day "	188,590	184,610	813	1,090
Night "	192,060	187 960	805	1,215
July 20th, Day " 6 hrs.	101,810	100,950	455	740
	1,996,360	1,953 650	9 488	11,277

(Week July 22 to 27 inclusive).

July 22nd, Day turn	182,430	179,220	786	1,030
Night "	201 690	197,140	500	1,276
July 23rd, Day "	200,610	196,230	734	975
Night "	200,330	197,050	835	1,236
July 24th, Day "	203,950	199,780	520	1,353
Night "	187,430	183,130	762	1,215
July 25th, Day "	196,930	193,155	985	852
Night "	189,110	186,280	812	1,149
July 26th, Day "	204,370	200,835	565	960
Night "	201,580	197,895	390	1,327
July 27th, Day "	103,900	99,980	766	815
	2,072.330	2,030,695	7,655	12.198

AVERAGE CHEMICAL ANALYSIS OF PRODUCER GAS.

(Week of July 15 to 20 inclusive.)

New Kentucky Coal.

	Producer Gas.	Flue Gas.
O	0.4	9.1
C O	24 5	1.1
C O_2	3.7	9.2
H	17.8	
C H_4	3.6	
C_2 H_4	3 2	
N	48.8	
Depth Fuel Bed	3'4"	
Pressure Blowing Steam	4 7 lbs.	

Gas Coal.

Kind: Illinois New Kentucky, run of mine.

Analysis.

Moisture	5 08 per cent.
Volatile Matter	37.32 "
Fixed Carbon	50.87 "
Ash	6 73 "
Sulphur	1.12 "

Analysis of Ash.

Ash	93.34 per cent.
Carbon	4.66 "

(Week of July 22 to 27 inclusive.)

	Producer Gas	Flue Gas.
O	0.7	8.0
C O	22.9	0.2
C O_2	4.0	9.2
H	18.8	
C H_4	3.7	
C_2 H_4	2.1	
N	47.8	
Depth Fuel Bed	3'3"	
Pressure Blowing Steam	4.7 lbs.	

Gas Coal.

Kind: Ft. Webster, Peena. Ft. Webster Gas Coal.

Analysis.

Moisture	0 78 per cent.
Volatile Matter	35.12 "
Fixed Carbon	53.02 "
Ash	11.08 "
Sulphur	1 57 "

Analysis of Ash.

Ash	86.36 per cent
Carbon	13.64 "

Results.

	1st Week.	2d Week.
Steel heated, lbs.	1996360.	2072330.
Steel heated, gross tons	891.21	925.14
Finished rods, lbs.	1953650.	2030695.
Finished rods, gross tons	872.16	906.56
Finished rods, per cent	97.861	97.991
Mill scrap, lbs.	9448.	7655.
Mill scrap, per cent	.475	.369
Finned ends, lbs.	11277.	12198.
Finned ends, per cent	.565	.589
Furnace losses, lbs.	21945.	21782.
Furnace losses, per cent	1.099	1.051
Total loss, per cent	2.139	2.009
Gas coal, total lbs.	125160.	110686.
Gas coal, per gross ton finished rods, lbs.	143.5	122.1
Steam coal, total lbs.	488640.	500190.
Steam coal, per gross ton finished rods, lbs.	560.3	551.7
Average I. H. P. Mill engine	917.	912.
Time of running, hrs.	114.5	114.
I. H. P. hours	104996.	103968.
Average I. H. P. Buckeye	24.	22.3
Time running, hrs.	126.	126.
I. H. P. hours	3020.	2802.
Total I. H. P. hours	108017.	106770.
Steam coal per I. H. P., lbs.	4.52	4.68
Finished rods per I. H. P., lbs.	18.1	19.0
Average output of rods per turn, gross tons	83.06	86.33

Summary.

*Steam coal per gr. ton finished rods.	560.3 lbs.	551.7 lbs.
Gas coal, per gross ton finished rods.	143.5 lbs.	122.1 lbs.
Mill scrap	.475%	.369%
Finned ends	.565%	.589%
Furnace loss	1.099%	1.051%
Total loss	2.139%	2.009%
Per cent good rods	97.861%	97.991%

Quality of Rods.

The rod rolled was slightly oblong in section, there being about one-half a gauge difference between maximum and minimum diameters, but this section was uniform throughout the length of the bundle. The maximum variation was less than a gauge and more often less than one-half a gauge.

In cutting off "finned ends" distinction was made between the rods which were to be used by the maker and those which were to be shipped to outside parties. The engineers in charge of the test carefully watched the bundles and saw that the usual practice of the mill in cutting off finned ends was adhered to.

Bibliography.

The Strange Story of Shan Dai. By R. R. Shuman. Published by Joseph T. Ryerson & Son, Chicago.

This sprightly work comprises 31, 5 x 8, freely illustrated pages, written by the editor of the *Boiler Maker and Sheet-Metal Worker*. It recites in fanciful fashion the rise and fall of the chief boilermaker of the Pharaohs, and the novelty of the tale as well as the attractive typography will induce many to spend a little leisure in unravelling the yarn. We understand the publication is on a similar basis to the other pamphlets issued by this company and is intended for general distribution to the trade.

The Production of Abrasive Materials in 1900. By Joseph Hyde Pratt.

This is a Government publication, an extract from Mineral Resources of the United States. Tables are given showing the production of abrasives for the last twenty years, and where possible some ideas are given as to the probable increase or decrease in the production. The report includes all the natural products that are used for abrasive purposes. They are treated under the following heads: Oilstones and whetstones, grindstones, pulpstones, buhrstones and millstones, infusorial earth and tripoli, pumicestone, crystalline quartz, garnet, corundum and emery. Besides these natural products, the artificial products, carborundum and crushed steel, are briefly considered. Carborundum has had a remarkable growth. When first discovered it was used by lapidaries, the price being from $2 to $15 per pound. This was in 1893. In 1899 the production was 1,741,245 pounds, which was sold at an average price of 8 cents per pound. During 1900 the production of carborundum was 2,401,000 pounds.

*Single cylinder, non-condensing engine.

ELECTRIC REDUCTION OF CHROME ORES.

At the falls of the Great Kanawha, some 36 miles above Charleston, W. Va., is a great industrial enterprise that has in it far more of interest than attaches to the manufacturing of any ordinary article of commerce. It is the Wilson Aluminium Works, which are not, as would be inferred from the name, engaged in the manufacture of any article from the lightest of metals. These works are employed in the reduction of chrome ore and the manufacture of ferro-chromium, which is utilized in the hardening of the steel of which armor plates for war vessels are made.

When the Wilson company entered the ferro-chromium business they came to deal with the ore so refractory that only electric heat was practicable for its reduction. It became necessary, therefore, to obtain a site for their plant where a great electric current could be secured at a minimum of cost. For this reason the location at Kanawha Falls was chosen. Here New River, which is joined by the Gauley, about two miles above, rushes over a precipice some 26 feet high, and is thereafter known as the Great Kanawha. The fall makes one of the finest water powers in all the country, the figures of engineers showing that at the lowest stage 8,000 horse-power of electricity is capable of development. Across the river, on the top of the solid rock forming the falls, the Wilson Company has built a dam to confine the water to a desired channel, and on the north side an electric plant of 3,000 horse-power of Bullock alternating current generators of the revolving field type has been installed and is now at work. The remainder of the power will be developed by machinery soon to be put in on the south side of the river.

In the incalculable heat possible to be kindled by this 3,000 horse-power of electric current the chrome ore is reduced to ferro-chromium, or as it is usually called, ferro-chrome. The ore gathered here to be reduced to pure metal is not picked up on the wooded mountain sides within easy reach of the company's works. Chrome ore is found in a number of places on the globe, but there are many qualities of it, and this company requires what is best suited to the special purpose for which it is intended—that is, which contains the highest ratio of chrome and the smallest proportion of iron. The ore used here is from Australia and Asia Minor, the most of it being from the latter country. There it is taken from the mines and carried many miles on the backs of camels to a port on the Black Sea, where it is put on shipboard and sent to this country, coming from the seaside to Kanawha Falls by rail. The metal produced from this ore is 70 per cent chromium.

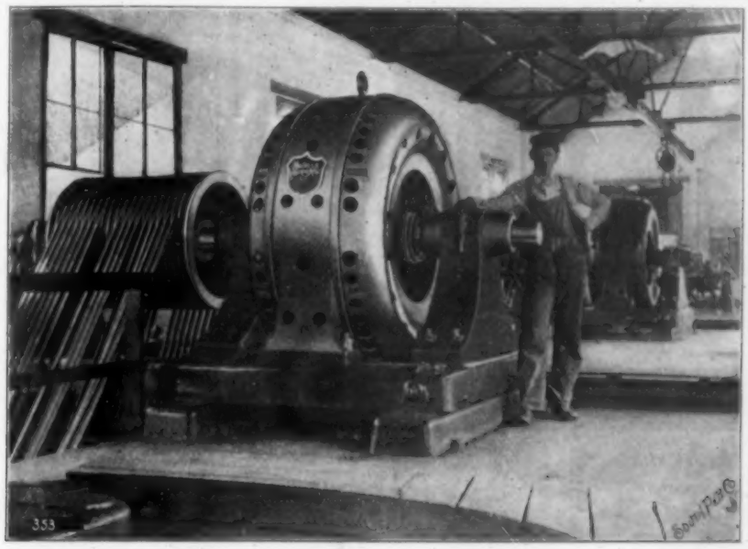


FIG. 1 —TWO 300-K. W. THREE-PHASE BULLOCK GENERATORS, WILSON ALUMINUM CO., HOLCOMBS ROCK, VA.

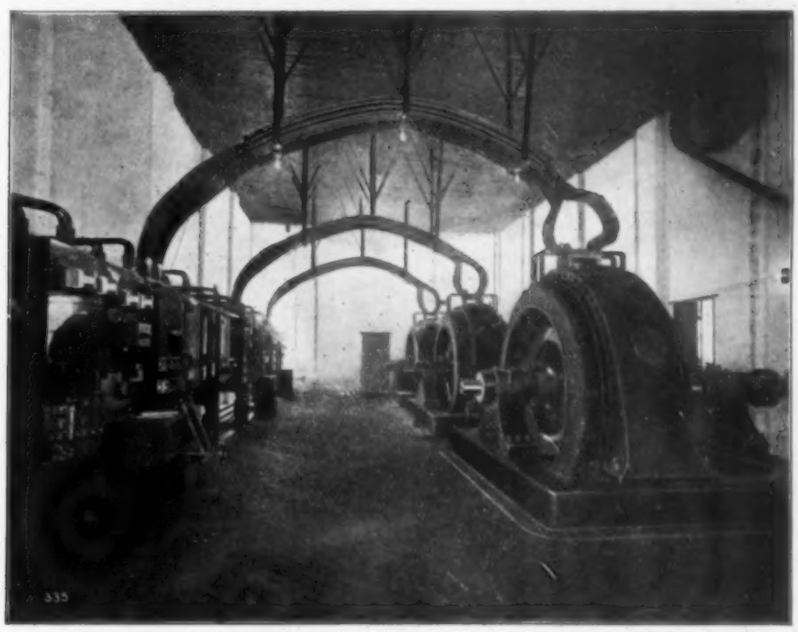


FIG. 2 —THREE 600-K. W. THREE-PHASE BULLOCK GENERATORS, WILSON ALUMINUM CO., KANAWHA FALLS, W. VA.

The entire output of the plant is contracted to the Carnegie Steel Co. and the Bethlehem Steel Co., to be used as alloy in hardening the steel for the armor plates which these companies are making for the United States Navy. To supply this demand, the Wilson Works will be run to their full capacity during the life of the Carnegie and Bethlehem contracts with the Government. Ferro-chrome is also used in making the projectiles used in modern warfare, thus appearing on both the offensive and defensive sides of the conflict. It is so hard that it will cut glass like a diamond.

TRAVELING LINK GRATE.

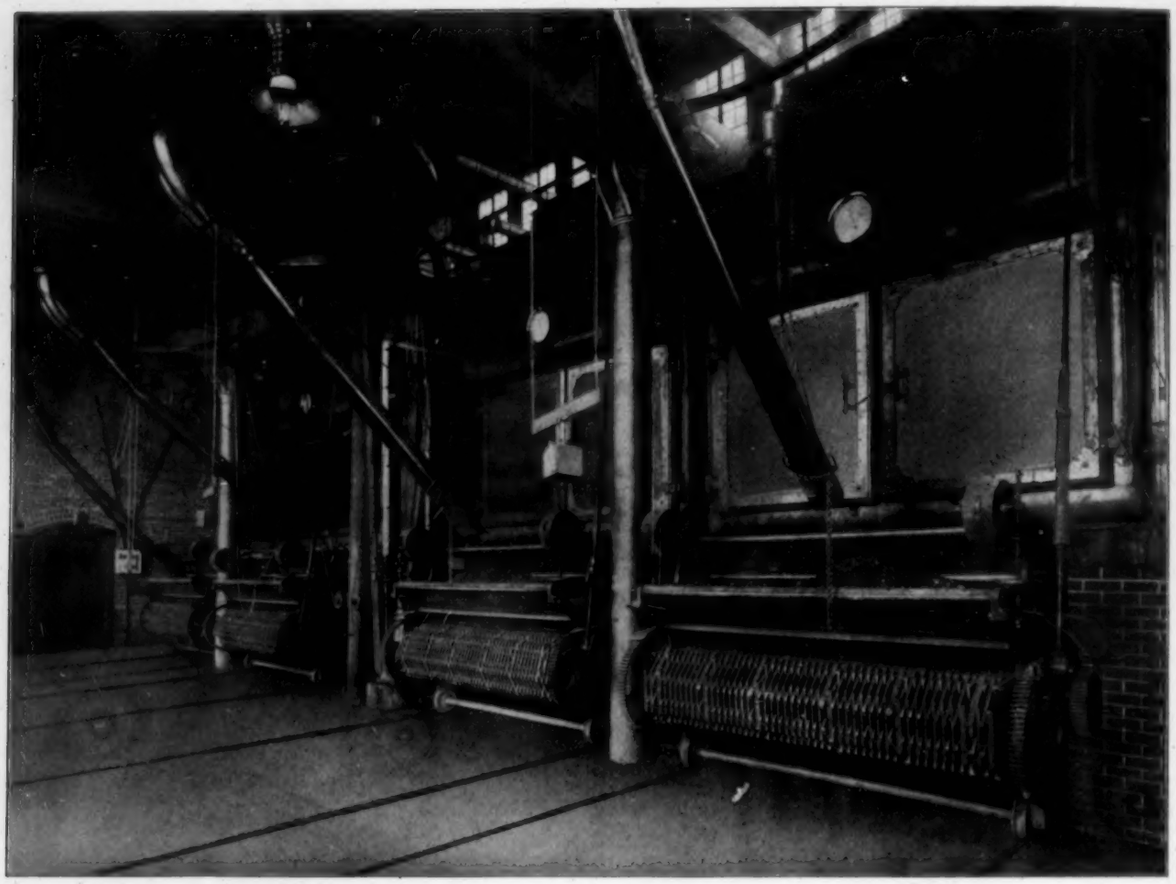
In the accompanying illustration is presented an endless chain grate for boiler furnaces. This grate, while resembling in general appearance some of the traveling grates already on the market, has some special features which make it very desirable. It has now been on the market for about four years, and has been, or is being, installed in steam plants of an aggregate of 100,000-h. p.

One of the principal features in which the grate differs from others of its class is that the clips or links are so formed as to be readily removed or replaced in the chain without removing crossrods or any of the principal parts. For this purpose the clips, or links, which are about a foot long, are slotted on the under side. There are two of these slots, which are enlarged into a circular opening, and which are provided to receive the transverse joining bars. The latter are oval, and of such shape as to allow the clips to be slid over them when held in a certain position. All the clips being in place on the adjoining bars, each bar is turned so as to bring its largest diameter across the opening, and being held in this position, the links cannot drop off or be removed. The joining bars are held in this position by means of outside links, known as binders, which have slotted openings to admit the ends of the joining bars when turned to the proper angle. The binders themselves are held in place by cotter pins. When it is necessary for any cause to remove or replace these slotted clips or links, the binding links of a pair of bars are removed, when, with a wrench, the bar is partly turned, permitting the links to be lifted off and replaced, and when in position it is again brought to its proper angle and the binders replaced.

Another feature is the method of providing bearings on which the chain rides. These bearings consist of heavy steel piping, mounted at their ends upon roller bearings, the ends being reamed or recessed so that the rollers rest in the nest of bearings, thus making a double roller bearing for each roll. By this means easy and positive motion is secured without the use of lubricants. The roller bearings are housed in so that they are entirely protected from dust and ashes.

The chain is moved by means of sprocket wheels, which are mounted upon the front driving shaft, and which engage with peculiar shaped driving links, which are placed in rows in the face of the grate chain, so that the sprocket wheels engage with lugs on these special designed links. A second set of wheels is mounted on the rear shaft, which is horizontally adjustable, to provide for the chain tension. The individual clips or links are corrugated on their upper surface and are air spaced, according to the character of coal and strength of draft. The grate is mounted on an iron carriage having wheels which run upon track especially provided, and which extend in front of the boiler to permit of the grate being entirely withdrawn from the furnace without interfering with the boiler setting.

The driving mechanism of the grate consists of a train of gears actuated by a ratchet, as shown, and is operated by a lever or rod, which is connected to an eccentric upon an independent shaft. This shaft may be located in the basement or overhead and is operated by a small engine. Besides the lever and ratchet, there is an attachment for operating the grate by hand, independent of the power connection.

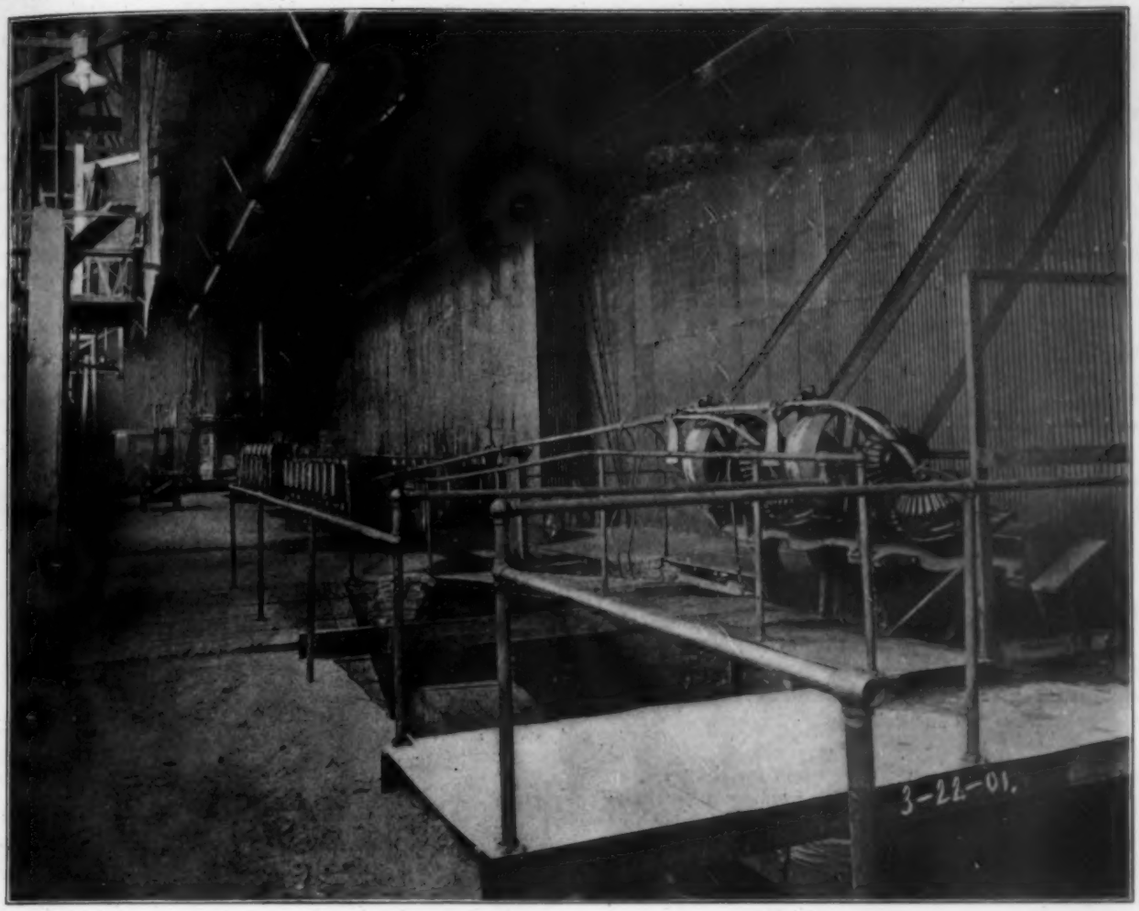


TRAVELING LINK GRATE FURNACES OF THE ST. LOUIS REFRIGERATING & COLD STORAGE CO.

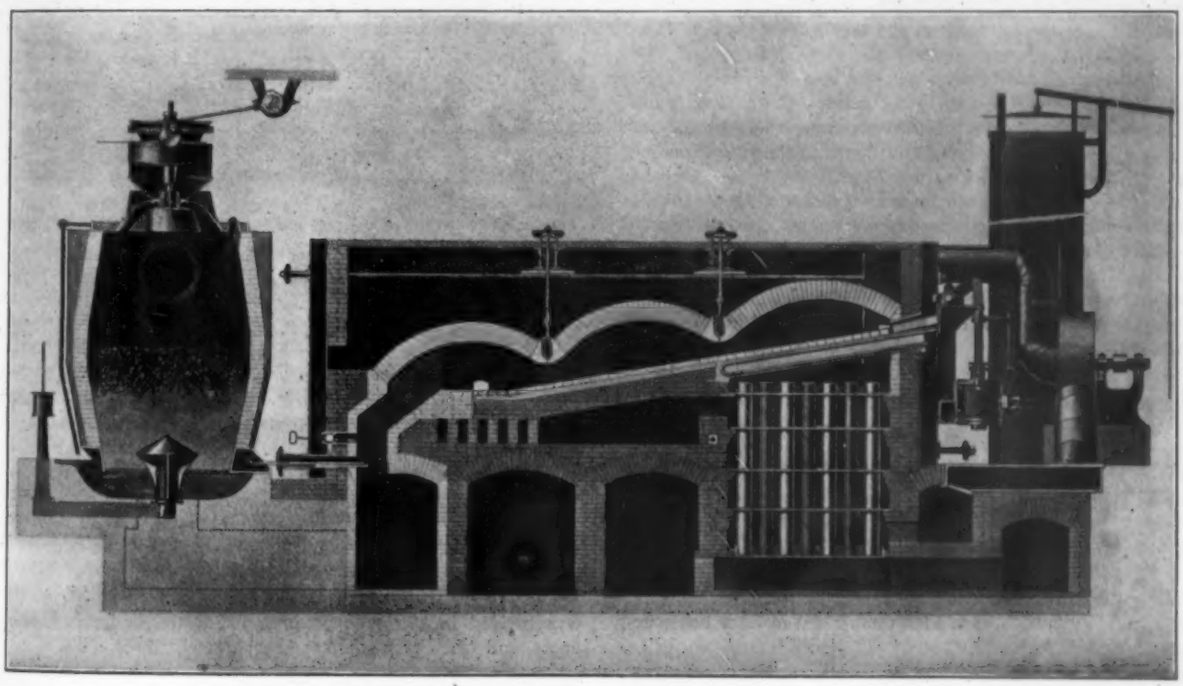
A coal hopper is provided, together with a feed regulating gate, and is formed by the side frames of the carriage, which are extended upward. There is also a removable hopper curtain. The regulating gate is lined with fire tile, and moved up and down within vertical guides, and is operated by means of a screw, power being applied by means of a hand wrench.

Another interesting feature in connection with these grates is the method of supporting the igniting arch. This is composed of specially designed fire brick, having grooves which permit of their being slid over steel channel bars, which are securely supported to the brick work. By this means, a plain, slanting surface is provided above the fire, instead of the arched construction which is usually employed. The economic features of chain grates of this type are in the direction of smokeless and economical combustion, especially when a low grade of bituminous slack is employed for fuel. The other features include low cost of attendance and low cost of maintenance and repairs.

These grates are manufactured and sold by the Green Engineering Co., 517-9 Western Union Bldg., Chicago. Among recent installations are the following: United States Glue Co., Milwaukee; Armour Packing Co., Kansas City; Cudahy Packing Co., Omaha; Anglo-American Packing Co., Chicago; Schwarzschild & Sulzberger Packing Co., Chicago; Chicago Union Traction Co., Chicago; United Railway Co., St. Louis; Metropolitan Street Railway Co., Kansas City; Milwaukee Electric Power Co., Milwaukee; Steubenville Light & Traction Co., Steubenville, O.; Cleveland City Railway Co., Cleveland; Sharon Steel Co., Sharon, Pa.; La Belle Iron Co., Steubenville, O.; Granite Bi-Metallic Mining Co., Montana; National Cash Register Co., Dayton; Lake Superior Power Co., Sault Ste. Marie, Ontario; Michigan Construction Co., Jackson, Mich.; C. A. Pope Tin Plate Mills, Steubenville, O.; St. Louis & Belleville Suburban Railway, St. Louis; Waukesha Sheet Steel Co., Waukesha, Wis.; St. Louis Refrigerator & Cold Storage Co., St. Louis.



GENERAL VIEW OF MORGAN CONTINUOUS ROD MILL, SHOWING FURNACES IN BACKGROUND.



SECTIONAL VIEW OF MORGAN SUSPANDED-ROOF CONTINUOUS FURNACE FOR SMALL BILLETS.

SUGGESTED AT THE SHOP.

BY F. O. REMAN.

The old-time shop was not particularly attractive as compared to the modern single-story affairs, windowed on top and sides, with many other conveniences for the handling of work under pleasant and healthy conditions. Not but that a good share of pleasure was to be had in the older establishments; far from that; but there is a sort of sympathy between the surroundings and the workman, and a bright, busy shop starts a kind of reflex action in the newcomer that pays good interest on the outlay for light, cleanliness and active management. Good work has been done under grimy conditions and with mighty poor tools, turning 36-inch pulleys on 24-inch lathes and finishing couplings on the ends of shafts that were long enough to be driven in one lathe and turned off in another, etc., with poor light: any one of these things impairs the efficiency of the plant. I never could see any reason for an excess of grime and these shops who have tried to get their machines in orderly shape and keep them so, have kept alive a personal pride in the help that has lessened the amount of dirt on the tools, the floor and the men.

* * * * *

I daresay a good deal of credit for this must be given the modern improvements in shop lighting; perhaps the dirt is more likely to be noticed than it used to be when light was less abundant. The electric light is a big advance in illuminating power and convenience as compared to the candle, usually stuck in a handy but infirm nut; or the malodorous oil lamp, with its unsightly petticoated body and attention-demanding wick. Compared to these the 16 candle-power lamp at the end of a string is immeasurably in the lead and many out of the way tasks are now accomplished with ease, that were formerly attended with extreme difficulty.

* * * * *

Even now, provision is not always made for the traveling of a machine, to and fro, in front of a fixed source of light. A planer, boring mill or milling machine has a cutting tool that stays to all intents and purposes in the same place for considerable time at a stretch; but on a lathe, for example, the tool may travel over a wide range and the light will need to be frequently adjusted if a watchful eye is to constantly scan the work between the centers. I went into a shop the other day, that among other things turns out lathes, and I happened to see the lathe where the lead-screws are cut. The lathe was equipped with three tools, two in front and one behind the work, and I fancy that the two in front act upon opposite sides of the groove in the screw. Some long lathes are made by this concern and of course long screws are occasionally in demand. The two lamps are fastened on the carriage and the reflectors turned so that the light is thrown directly on the point of the respective thread tools; over the lathe is stretched two stout bare-copper wires connected to the source of electricity, and an upright pipe attached to the carriage bears a couple of trolley wheels that run on the under side of the wires. The wheels are wired to the lamps and the carriage may thus travel ten feet or more without affecting the light on the work.

* * * * *

Lathe-work is of course interesting to me and I am constantly looking out for any new developments in that direction. The lathe is easily the king of machine tools and is likely to hold that position for a long time to come. Improvements will be made from time to time, but it is doubtful if judging by the experience of the past there is to be any very revolutionary advances in design. Lately some changes have been introduced in the change-gearing, following the example of the lathe built at Cornell by Prof. John E. Sweet, but a conservatism seems to have been established in lathe construction that is here to stay. One of the places least likely to be changed is the tool-post. It cannot well be simpler; a single screw, a slotted post, a concave washer and a convex shoe is the entire outfit and as it is now made it will stand an amount of ill usage that would be startling if custom had not made us indifferent. Compared with the four-screw arrangement found frequently abroad, it is less wasteful of time when using a single tool.

Compare either the American or the English form with the tool-post shown in *The Iron Trade Review* of last week. Here are five or six screws, according to the judgment of the manufacturers, and several pieces to be jammed together with the lathe-tool. The increase of screws is objectionable unless very great advantages are to be secured by having them there and the adjusting screw to force the tool ahead is only useful when two or more tools are on the same carriage and a relative adjustment of the different depths of cut is desired. On a single lathe tool the regular cross-feed screw will do the job and even in the case of a couple of lathe tools it is not difficult to make a change in the adjustment. Putting a key in the T-slot to bear against a flat on the post is of questionable advantage as the tool-posts will stand about all the belt will pull unless the tool is run out an exceptional distance. I have had inside-turning tools overhang a considerable distance and have got over any trouble about the tool-post turning around by sticking a piece of steel in the T-slot and having it engaged with the heel of the lathe-tool. The common lathe-tool may be held against heavy chips with greater security by swinging the tool, so that when it is tightened up it bears on the edges of the slot in the tool-post.

* * * * *

I have no particularly conservative notions about shop practice and would throw overboard any method as soon as a better one comes to hand. I am not therefore prejudiced against the tool-post I have mentioned, simply because it is new, but it does not seem to have sufficient advantages to warrant a change in tool-post construction.

OBITUARY.

On Monday, August 26, Peter Ferry, well known to the iron trade in the West and South passed away at his home in St. Louis, Mo., at the age of 75 years.

Mr. Ferry was born in County of Fermanagh, Ireland, April 15, 1826. He received a limited education and at an early age served an apprenticeship in the iron makers' trade, which he followed in his native country until he came to America in 1849. He first settled at Johnstown, Pa. While working there he saw an opportunity to better his condition, and after he had succeeded in promoting the iron manufacturing firms of White & Co. and Lloyd & Co., he was made the superintendent of both. Through his efforts the firms were so successful that he attracted the attention of Chouteau, Harrison & Valle, of St. Louis, and they induced him to enter their service with the object of converting their charcoal furnaces into coke furnaces, in which he was successful. Soon after he also developed the company's Big Muddy coal lands at Grand Tower, Mo., and sites for two blast furnaces were selected, but before anything further was done came the panic of 1857, and then the civil war. The plans were abandoned and in 1861 Mr. Ferry started out to investigate the mineral resources of Pike's Peak. He was a strong Southern sympathizer, and while en route was captured by federal soldiers. His wagon train and all effects were confiscated, and he was turned loose. On foot he made his way to the Rockies and began work in the mines at $2.50 a day. He visited the place which in later years became Leadville, and in 1862 went to Virginia City, Nev., where he remained a year. In 1863 he went to British Columbia, and a year later to Deer Lodge, Mont. After two years of mining at this place he went back to Pennsylvania and located at Hollidaysburg. He was married in 1865, and shortly after went to Leetonia, Ohio, and became superintendent of the Grafton furnaces.

The project with which he had been engaged at St. Louis was revived in 1869 under the name of the Kingsland furnaces, and Mr. Ferry was called to take charge in 1871. He resigned later and became superintendent of the Missouri & South St. Louis blast furnaces, which were also located in Carondelet. The Kingsland Co. later engaged him, and thereafter until 1890 he devoted his entire time to the Kingsland furnaces. The name was then changed to the Vulcan Iron Works. From 1882 to the time of his retirement Mr. Ferry traveled through the South putting in furnaces for his company.

The Pan-American Exposition-VII.

SOME MACHINE-TOOL EXHIBITS.

(Staff Corespondence.)

BUFFALO, Sept. 10.—The Pratt & Whitney Co, Hartford, Ct., has an exceptionally fine collection of machine tools, arranged in such a way that a closer acquaintance with their characteristics is easily to be obtained. The company manufactures a varied and lengthy list of tools: some of the smaller tools are displayed in the case shown in the foreground of the halftone. This case contains sets of all types of taps, dies, reamers, milling cutters, die stocks, cylindrical, plug and thread gauges, bench lathes, bench milling machine, sub press and samples of work, samples of various kinds of hand and automatic screw-machine box tools, right and left hand chucks, revolving chucks, die holders, hollow mill holders, samples of gun-barrel drilling, samples of the type of drill used in the Pratt & Whitney Co.'s barrel drilling machine. There is also shown a small model of the famous long Cecil gun which was made at Kimberley during the siege of 1899 and 1900.

FIG. 1.—PRATT & WHITNEY CO.'S EXHIBIT.

This is one of a lot of twenty or more made by this company for the De Beers Consolidated Mines Co., South Africa. The model is constructed accurately to scale, one inch to the foot. There are also shown sets of car builders' gauges, tapping fixtures, combination lathe thread tools, ratchet drills, counterbores, male and female end gauges etc.

The machine tools do not show to good advantage in this view or in any other photograph that I have yet seen. Photographing machinery in wholesale style leaves out many of the details that are of far greater interest to the mechanic than the effect that such an exhibit produces in a general way: on the other hand a photograph of each machine would be merely a repetition of the pages of the catalogue. The machines shown in the exhibit are as follows: A 10-inch toolmakers' engine lathe, 5-foot bed. A 13-inch weighted engine lathe (1900 model), 6-foot bed with taper attachment. A 14-inch engine lathe, 6-foot bed, compound rest and taper attachment. A 16-inch turret-head chasing lathe with friction head. All these lathes are thoroughly equipped with tools and all regular attachments. A two-spindle centering machine, complete with tools. A type C adjustable multiple-spindle drill, with power feed to table, twelve spindles with ball joints. A 14-inch pillar shaper, with vise: these shapers have ball-bearing thrust collars on the knee-elevating screw and the vise has one of the jaws V-shaped for holding circular pieces, and the jaw can be swivelled to present that or the straight face to the work. Both of these features are of interest to the man who has handled a sharper; or, and this is the more important item, the man who intends to handle one. I must not omit to state that the vise on the Pratt & Whitney shaper has the actuating screw pass through the solid jaw: this seems more sightly to me than the nut which is usually cast on the end opposite. The vise is graduated on the base and the jaws are faced with hardened steel. Among the remainder of the tools is a die-sinking machine. A two-spindle profiling machine, with former cutting device. A power milling machine with 6-foot bed. A turrethead hand screw-machine, fitted with tools for finishing cock keys. An automatic screw machine fitted with drawback collect mechanism for three-jaw chuck two speeds, and tools for first operation on typewriter buttons. An automatic screw-machine, fitted with two speeds and tools for second operation on typewriter buttons. Both these machines are the same size, number 12; there is also a number 14 of the same type on exhibition.

A 24-inch measuring machine is shown complete with microscope, etc. The measuring machine has an interesting feature in the means adopted to inform the operator of the end pressure on the piece under examination. Before going into this matter it may be well to state that the Pratt & Whitney measuring machine has a heavy casting designed on the lines of the familiar lathe bed: this supports a head and tail stock fitted with spindles. The one spindle can be advanced or withdrawn into the head by a screw and a finely-divided scale and microscope determines the amount of motion and, consequently, the length of the piece under examination. It is evident that few people could bring the two abutting parts together with exactly the same pressure; in fact it would prob-

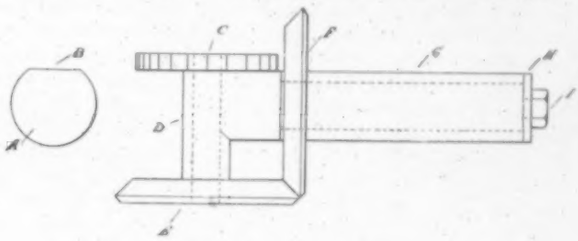


FIG. 2.—MILLING TOOL FOR USE ON SCREW MACHINES.

ably be exceedingly difficult for the same individual to do this with the accuracy that these delicate measurements are to be made. The Pratt & Whitney people get over this trouble in an extremely simple manner: the opposing spindle to the screw, rests against a spring and is thus capable of a slight endwise motion. On this spindle is a collar having an arm which pinches a small plug against a casting: the plug is placed in a horizontal position and is so held that if the pressure be slightly released the plug will drop to a perpendicular position but will not fall out of the machine. Now it will be understood that when the piece to be tested is put into the machine and the screw is brought gently to bear on the end, the moveable spindle will loosen its grip on the plug and the indicator will drop to the vertical position: it will do this irrespective of that peculiar difference in temperament or training that we usually take cognizance of as the personal equation of the individual. The dropping of the plug thus indicates the pressure and the method is sufficiently simply and accurate to fill all requirements of a practical character.

One of the screw-machines in this exhibit was finishing brass plugs for gas and pet cocks; it might be a little more precise to say that it was equipped to do this class of work, was belted up ready to run and was run whenever any one desired to see the machine in action. It was a lively little machine, capable of rushing the brass work along at a rate of 60 or more pieces to the hour. The several turret tools are of note but my interest centered upon the tool which was used to mill the flat for the washer on the plug. Figure 2 shows the tool scheme in a general way after a rought sketch made from memory. *A* is an end view of the finished plug and *B* shows the flat place which has been milled off to fit the washer: the other part of Fig. 2 shows the means employed to attain this end. *C* is a milling cutter firmly attached to a

spindle passing through *D* and having a bevel gear *E* at the opposite end to *C*; the gear *E* meshes into another gear *F* fastened on to the sleeve *G*. The part *D* is prolonged through the sleeve *G* with a nice running fit and has a bearing at the end near *F* and a washer *H* and a nut *I* keeps the tool in place in the sleeve. The sleeve is of course held in the turret in the usual manner. A light strip of metal is fastened to *D* and projects toward the chuck, where it engages with a point on the periphery as the slide is moved toward the headstock. Assuming that a pet cock has been put into the machine, brought into line with the bell center and turned off: the turret rotates and brings the milling tool in place. As it is advanced to the casting *A*, the arm fastened on to *D* engages with the chuck and rotates at the same speed with *A*: the bevel gear *E* will not only travel around the axis of *D* as it works in the sleeve *G*, but will have a motion derived from the stationary gear *F* and as *E* turns the milling tool *C* will cut the flat *E*.

The "Gisholt" Exhibit.

The Gisholt Machine Co., Madison, Wis., has a 24-inch turret machine for castings usually finished in the chuck, with direct-connected electric drive, power movement to the turret slide, and complete tool outfit. The machine is shown in actual operation. The Gisholt lathe is a very heavy tool, the designer having carried the anvil principle out boldly into the casting and the massive outlines of the machine cannot but be impressive to the machinist at first glance. The first impression is deepened on an investigation of the construction and the tools: the headstock is cast solid with the bed and the body is carried in unbroken lines down to the floor. It is evident that a machine so constructed will stand a vast amount of hard usage and the limit to which the tools can be forced is not to be found in any likely vibration of the spindle or bed but must be sought elsewhere. The turret is a rugged affair with the axis inclined toward the back of the machine, so that the tools as they swing around are high enough to pass easily over the arms of the capstan that operates the slide. This is an essential feature because the tools are extended to a length sufficient to allow them to have a bearing inside the chuck and spindle supporting the work and this additional support allows an increase in the cut that is only to be fully realized by seeing one of these machines at work.

There is a universal grinder in the exhibit intended to grind lathe and planer tools. This machine is arranged to allow the use of a plentiful supply of water and by means of a graduated base the tools can be sharpened on a uniform plan. The time when workmen waited for a chance at a slow-cutting grindstone is waning fast: there was a lack of uniformity about the tools ground under that antiquated system that was an indication of varied experience or perhaps lack of thought. When the tools are ground by one man according to one method and finished in quantities there can be but little loss of time due to the inferiority of the form of the cutting edges and a newcomer in the shop is so far on an even footing with the other workmen: no waiting for the old tool to be renewed, simple drop the old one and take up the new. There was a set of 57 tools on exhibition, finished to the Gisholt requirements: a chart is sent out with the machines giving the best angles for the different forms of lathe and planer tools, and the tools dressed to this method have all the appearance of a capacity for vigorous service.

The Potter & Johnston Co.'s Exhibit.

The Potter & Johnson Machine Co., Pawtucket, R. I., has a Simplex automatic chucking, boring and turning machine, equipped with a patented lever chuck; and castings that can be handled with one hand may be put into the chuck and taken out without stopping the spindle. Boring bars can be supported by bushings in the chuck. There are no cams to change, all changes being made by adjustment. The cross-slide works automatically, and is used for facing, forming or cutting-off. The main dimensions follow: The machine swings 21 inches over the bed, and 10 inches over the cross slide. Distance between face of chuck and face of turret at extreme backward positions, 31 inches. The working travel of the turret is adjustable in any position between the extreme backward and the extreme forward working positions. Greatest working travel of turret side, 20 inches; least, 2 inches. Travel of cross slide, 10 inches, 5 inches out, 5 inches in. Greatest distance of cross slide tools from center, front, 10½ inches; rear, 16 inches. Least distance of cross slide tools from center, 0. Longitudinal adjustment of cross slide on bed, 14 inches. Cross slide longest travel, 10 inches; least travel, 0. Front and rear tool have each 5 inches of maximum travel, and will face 5 inches wide surface on any section of diameter up to full swing of machine. Cross slide cutting tools automatically clear the surface on the return stroke after finishing the cut, to avoid the mark caused by the drag of the tool. Power of gearing (slow train), 20 to 1; fast train, 8 to 1. Width of driving belt, 2½ inches. Diameter of hole in spindle, 2⅛ inches. Automatic changes of speed (slow gearing), between 8 and 44 spindle revolutions per minute; fast gearing, between 20 and 109 revolutions per minute. The turret is hexagon in shape, 13½ inches across flats, to which may be bolted box tools, and has six 2½-inch holes. This machine is designed to fill the same requirements in brass, cast-iron and steel castings that an automatic screw machine does on bar work. The firm exhibits also two shapers: one 15-inch universal, having a knee capable of swivelling 180 degrees, and a table which tilts in a transverse direction. The head has a power down feed at any angle through an arc of 90 degrees with an automatic stop, ten changes of feed, which can be changed instantly from one feed to another while the machine is in motion; this is accomplished by throwing the index finger to the left or to the right, and allowing the spring pin in the finger to engage in the desired hole in the face of the disk, upon which the index finger rotates. When pin is in lower left-hand hole the feed is at zero. The down feed motion is controlled by the location of a knurled screw.

The 24-inch shaper has a table of very strong construction. It has three sides, with five T slots on each side, and is raised and lowered by power. As a machine of this capacity has necessarily very heavy slides, this device makes it much easier for the workman, and, of course, enables him to turn out a greater amount of work. The operator has simply to throw a lever over on one side for raising and the other side for lowering. The machine on exhibition has a plain table, but may be furnished with a swivel table with worm and worm gear circular adjustment, of the same construction as the 15-inch machine. A graduated dial enables the ram to be set at any desired length of stroke, and this may be altered while the machine is in motion, allowing the operator to work to an irregular line. The cross-slide is mounted on ball bearings, and the cross-feed screw, also the tool-head feed screw, has graduated collars for fine adjustments. The vise is arranged to draw the work down, by means of sliding jaws, when gripped; bringing the piece at once to a bearing and avoiding the need of a persuasive hammer or a too convenient wrench.

A Vise Exhibit.

The Cullan vise I mentioned a week ago does not have the field entirely to itself in regard to peculiarity of design: there is a vise exhibit here by the Emmert Mfg. Co., Waynesboro, Pa., that will be decidedly interesting to the patternmaker. It is a solid metal affair, about 80 pounds in weight, with two main jaws 7 x 18-inch smoothly planed and, normally, moving parallel. The ends are squared and the screw sleeve run through the center so that the workman can place his work on either side, making it a right or left-handed vise. A vise is a substitute for the hand and the best vise will hold the work just as conveniently as it can be gripped with the fingers, and with very much more power. The vise under consideration will not only hold the work firmly, but is capable of presenting it to the operator at any angle without loosening the jaws prior to making a change. The vise not only grips with its fingers, to continue the analogy, but has all the possible imitations of the wrist and elbow actions; and the piece held in the jaws is freely moved to suit the cutting tool. Irregular work is handled either by the device which throws the entire jaw out of parallel to permit the gripping of tapered work, or the irregularity may be offset by the use of a tilting jaw which fits into a V-shaped slot cut in the face of the inner jaw.

The Thor Iron Co., Auburn, N. Y., has been incorporated with $50,000 capital stock. Oliver Watson, of Auburn, is interested.

MACHINE CAST FOUNDRY PIG IRON.*

Pig iron cast in iron molds is known by various names in the trade, such as, "chilled pig iron," "iron cast in chills," "machine-cast pig iron," "sandless pig iron," "sand-free pig iron," etc. You are all familiar with the older method of casting pig iron in sand. The stream of iron coming from the furnace and passing down the center of the casting house, is turned to fill the first row of sand molds, usually located at the far end of the casting house, although at some furnaces the bed nearest the furnace is filled first. When one row or bed of molds is nearly full, a gate is opened and the iron passes from the central "runner" into the second row, etc., until the cast is completed. The main stream is called the "runner"; the feeder to each row or "bed" of molds is called the "sow," and the sand molds branching off from the "sow" are the "pigs."

No one can be about a blast furnace very long without having the difficulties attending the casting of pigs in sand brought forcibly to his notice. Furnaces sometimes smelt and reduce the ore irregularly, so that there are times when the casting house is hardly cleared and made ready for another cast before the furnace should be again tapped. This is especially true if the skimmer has been washed away in the previous cast, and much of the iron covered over with a mass of cinder, so that the work of breaking up the hot iron and carrying it out of the casting house has been unusually hard. Work on the hot pig beds is severe at best, and there is always trouble in getting laborers to stand this heavy work with its rapid changes of temperature, especially as it means work every day in the year, including Sundays and legal holidays.

With a small product of say, 100 tons per day, the casting of pigs in sand is not so serious a matter, but some better method of casting became absolutely necessary with the modern furnaces having a daily output of 300 or 500 tons or even more. As Uehling says, "'Necessity is the mother of invention," and the casting machine came into existence through sheer necessity, not to say desperation.

As far as I know, seven different forms of pig iron casting machines have been built and operated. The Uehling machine, designed by Mr. H. A. Uehling, was first put into successful operation at the Lucy Furnace of the Carnegie Steel Co., in September, 1896. Heyl & Patterson, Pittsburg, designed and erected for the Cambria Steel Co. another form of casting machine, which was put into successful operation in February, 1899. Mr. Davies designed and successfully operated a casting machine at a blast furnace plant in Canal Dover, Ohio. Mr. John M. Hartman, Philadelphia, erected a casting machine at the Hollertown furnaces of the Thomas Iron Co., which was first successfully operated on June 23rd, 1900. Mr. Erskine Ramsey, of Birmingham, Ala., designed another form of casting machine for the Tennessee Coal, Iron & Railroad Company.

In England, Mr. R. H. Wainford designed and erected at the Clarence Works of Bell Brothers, Middlesbrough, a casting machine which has since been referred to as "The Bell Clarence Pig Casting Machine," and finally, Karl Orthof Donawitz, near Loeben, in Styria, has designed still another form of casting machine.

At some blast furnaces, both at home and abroad, iron molds are used instead of molding the pigs in sand. This has been the practice for many years at the charcoal blast furnaces of Sweden.

Advantages of Machine Cast Pig Iron.

The advantages of machine-cast pig iron to the makers of basic open-hearth steel are now universally recognized. The number of basic open-hearth furnaces receiving molten iron from a mixer, or direct from the blast furnace, or in some cases from a cupola, is on the increase. In cases where the iron is charged as pigs, the machine-cast iron is always called for, and sand-cast basic iron accepted only at a reduced price. With a machine-made iron there is no sand to attack the basic furnace lining. The higher proportion of combined carbon unites during melting more rapidly with oxygen than the graphite does, the bath when melted is lower in carbon than when using sand-cast iron, and hence more quickly converted into steel. These advantages in brief mean less fuel and increased output.

In puddling furnaces the machine-cast iron is also more advantageous than the sand-cast iron. The variable quantity of silica, with some little alumina, added to the bath in the form of sand adhering to the sand-cast pigs, causes irregularities in the basicity of the puddling cinder and hence irregularities in the amount of phosphorus and sulphur removed. With machine-cast iron the basicity of the puddled cinder is governed more closely by the silicon in the pig iron and the silica in the "fix" causing greater uniformity in the composition of the cinder which in turn gives more uniform product and tends to prevent sudden and irregular cutting of the furnace linings. The increased proportion of carbon in the combined state in the machine-made iron is likewise an advantage, as the puddling operation is thereby shortened without detriment to the product.

In the use of Bessemer pig iron and of low phosphorus pig iron, whether melted in the cupola for the Bessemer converter, or melted in an acid open-hearth furnace, the same advantages result by the use of machine-cast iron as have already been outlined above.

It is, however, the application of machine casting to foundry pig iron with which this audience is most interested. Let me first call attention to the economic advantages resulting in the use of a machine-made foundry pig iron, and then speak of the difficulties attending its introduction in the foundry trade.

In purchasing a machine-made foundry pig iron, the customer will receive 2,240 pounds per ton of iron shipped; there can be no dispute about short weights and that abomination, the "sand ton" of 2,268 or 2,256 pounds per ton is abolished. The amount of sand adhering to iron cast in sand varies greatly. When the iron is loaded directly from the casting bed and only has a short haul to the foundry, the sand on the pigs is excessive. If loaded from stock and hauled a considerable distance, more of the sand shakes off before the pigs reach the cupola platform, but at best that remaining is a detriment and frequent cause for dispute in weights and an expense in melting.

In melting machine-made iron, the founder will find that he uses less limestone and that therefore less slag is produced. This means less fuel to dissociate the carbonic acid gas in the flux, and less fuel to melt the smaller amount of slag produced; also less loss of iron in the slag. The machine-cast iron also melts easier, an item which gives a further saving in fuel.

The melted iron is cleaner, contains no dross, and that frequent cause for defective work, "dirty iron" is absent when using a machine-cast pig iron.

Another advantage of machine-cast iron is that the pigs of the cast are more nearly alike in chemical composition than pigs of a cast of iron run from the furnace into sand, and furthermore, there is a greater uniformity in the different parts of a machine cast pig than in sand-cast pigs. This greater regularity of the different parts of a cast is due to the fact that the furnace is tapped into twenty-ton ladles and the iron is thus mixed before casting the pigs. These are more uniform in composition because they solidify more rapidly in the iron molds of the casting machine, and hence there is much less time for the impurities to segregate towards the top and center of each pig.

Foundrymen's Objections to Sandless Pig Iron.

The author has met with four objections made by foundrymen to iron cast in chills, whether in the metal molds substituted for the beds of sand in the casting house or the molds of the casting machine.

First—The prejudice against all machine-cast iron, due to the sale of some sandless misfit basic pig iron for foundry purposes.

Second—The large size of the machine-cast pigs.

Third—The close-grained fracture as compared with the fracture of sand-cast iron.

Fourth—The difficulty in drilling the pigs for analysis.

These will be briefly discussed in turn.

First—There is a well-grounded prejudice to machine-cast pig iron, owing to the sale to foundrymen of misfit basic iron cast in chills, which, although perhaps high enough in silicon,

*From a paper read at the September meeting of the Philadelphia Foundrymen's Association, by Albert Ladd Colby, Metallurgical Engineer of the Bethlehem Steel Co.

is also often high in sulphur. Doubtless in many cases this iron had not the best analysis for the purpose for which it was sold to the foundryman. It was perhaps too high in sulphur, and very likely too low in total carbon for the kind of casting into which it was made. The unsatisfactory result attending its use has given a bad name to all machine-cast iron in general, and has prejudiced the foundrymen against its use. This is unjust to those furnaces making first-class machine-cast foundry iron, but the prejudice is not to be wondered at; it can only be overcome by a straightforward explanation of the facts; and by giving a guaranteed analysis of the standard machine-cast foundry pig iron offered.

Second—The large size of the pigs of machine-cast iron have been objected to. Some of the casting machines make a large pig, too heavy to conveniently handle on the cupola platform and too large for economic melting in small cupolas. The Bethlehem machine-cast pigs, however, weigh not over 90 pounds each, and are of such a shape as to be readily broken if desired to be melted in very small cupolas.

Third—The main stumbling block to the introduction of machine-cast pig iron in the foundry is the appearance of its fracture; its looks are against it. There are two ways of meeting this objection. First, by proving to the foundryman that the machine-cast iron, although having a close-grained fracture, will make, if it has the right chemical contents, as soft and as easily machined a casting as an open-grained sand-cast pig iron of the same analysis.

at point of fracture of one square inch, gave the following results.

Standard U. S. Army Test specimen cut from	Tensile Strength lbs. per square inch.
Machine-cast pig	41,000
Sandcast pig	15,000

	Cast Vertically.	Cast Horizontally.
Test ingot cast from machine-cast pig.	17,000	17,000
Test ingot cast from sand-cast pig.	16,300	18,000

Castings made at the same time as the above test ingots, from remelted sand and remelted machine-cast iron, were machined with equal ease and showed similar fractures. The following analyses show that the excess of combined carbon in the machine-cast pig disappeared after remelting.*

	Carbon. Combined.	Graphitic.	Total.
Sand-cast pig	.250	3.210	3.460
Machine-cast pig	.920	2.460	3.380
Test ingot cast by remelting sand-cast pig—			
Cast vertically	.368	3.022	3.390
Cast horizontally	.470	2.930	3.400
Test ingot cast by remelting machine-cast pig—			
Cast vertically	.257	3.100	3.357
Cast horizontally	.336	3.028	3.364

Another practical illustration of the fact that the chill in the pig iron does not reappear in the casting made therefrom, if

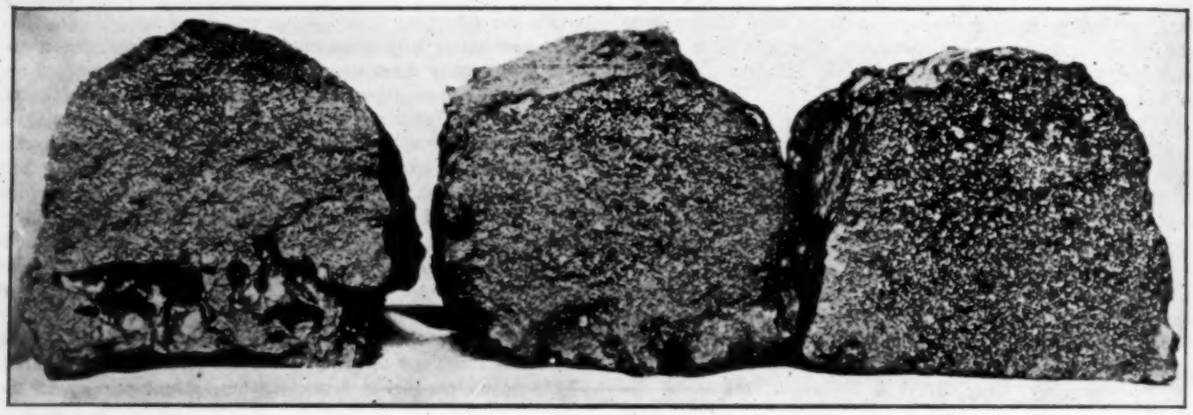


FIG. 1. FIG. 2 FIG. 3.

FRACTURES OF THREE PIGS OF THE SAME CAST OF IRON.

Showing dissimilar appearance of sand cast iron of same composition.

	Comb. Carb.	Graph. Carb.	Total Carb.	Si.	S.	P.	Mn.
Fig. 1. Beginning of cast	.75	3.52	4.27	1.81	.018	.083	.50
Fig. 2. Middle of cast	.61	3.32	3.93	1.81	.017	.084	.51
Fig. 3. End of cast	.68	3.52	4.20	1.80	014	082	52

The close-grained fracture is due to the quick-cooling and to the temporary conversion of considerable of the total carbon into the combined form, with a corresponding temporary reduction of the percentage of graphite. The change of carbon is caused by the chilling action of the iron molds of the casting machine, and the further and deeper chill caused by the sudden cooling of the hot pig by immersion in a bath of water. This difference in the proportion of combined carbon is illustrated by the following analyses of a cast of Bethlehem iron, a portion of which was cast in sand, and a portion in the casting machine.

Cast No. 7,602.	Sand Cast.	Machine Cast.
Combined Carbon	.250 per cent.	.920 per cent.
Graphite Carbon	3.210 per cent.	2.460 per cent.
Total Carbon	3.460 per cent.	3.380 per cent.
Silicon	3.00 per cent.	2.99 per cent.
Manganese	.95 per cent.	.95 per cent.
Phosphorus	.770 per cent.	.773 per cent.
Sulphur	.041 per cent.	.041 per cent.

The increased percentage of the combined carbon, the uniform close grain, and in some cases the increased density of the machine-cast pig iron, gives higher tensile strength on specimens cut from the chilled pigs than on those cut from the sand-cast pigs. This increased tensile strength is misleading for it only exists in the pig itself. When both the machine and sand-cast pigs of the above cast, No. 7,602, were remelted separately in a cupola and cast into similar-sized test ingots, standard test specimens threaded on each end, and of an area

the chemistry is right, is the use of old chilled iron car wheels by foundrymen. At one time when old car wheels were cheap the speaker knows of an instance where 5,000 tons were purchased by a maker of cast iron pipe. The wheels showed a deep chill, but the chill did not show in the pipe. The wheel made strong pipe, but it was uniformly gray in fracture and contained no hard or chilled spots.

The second method of meeting the objections of the appearance of the fracture of machine-cast iron, is to submit to the foundryman facts showing how often the appearance of the fracture of sand-cast iron is misleading, and prove to him that chemistry is the only safe guide to uniform success in the foundry. How can regular results be expected in the foundry when buying pig iron by grade, when the published analyses of nine different brands of say No. 1 Northern coke foundry iron vary as follows in silicon: 1.75 per cent, 2.00, 2.40, 2.53, 2.70, 3.00, 3.08, 3.25 and 3.44. These analyses, as well as the following, were selected from S. R. Church's book entitled "Analyses of Pig Iron," published in May, 1900. Notice the wide variation in silicon in nineteen different brands of No. 2 Southern coke pig iron: 1.73 per cent, 1.92, 2.01, 2.14, 2.16, 2.25, 2.32, 2.40, 2.42, 2.45, 2.47, 2.50, 2.88, 2.90, 2.92, 3.05, 3.12, 3.30, and 3.79. These variations could be proved by further quotations to exist in all the different grades of both Northern and Southern coke foundry pig irons.

* For a more detailed account of this experiment, see THE IRON TRADE REVIEW, June 13, 1901, pp. 25 27, *Iron Age* of June 20, 1901, pp. 22-23, and *Journal of American Foundrymen's Association*, Vol. X, June, 1901.

In fact the argument can be narrowed down to the different shipments of No. 1 iron of the same brand and from the same furnace. Let the foundryman have each car of his No. 1 iron, purchased only on grade, analyzed for silicon and sulphur for, say two months, and the wide variations in the figures will surprise him. The converse of the above statement also holds good, for often iron of the same brand and of widely different grade, as shown by the fracture of the sand-cast pigs, is exactly alike in chemical analysis. A striking example of this fact is shown in the accompanying illustration of the fracture of three pigs from different parts of the same cast of a Western Bessemer pig iron.

Why should a foundryman continue to purchase iron by the appearance of its fracture when every conscientious furnaceman will admit to him that wide variations exist in the composition of the same grade of iron, and that often the foundryman pays a higher price for a No. 1 iron than there is any necessity for?

The author does not mean that the foundryman can safely ignore the fracture of sand-cast pig iron if he does not include the total carbon in his chemical specification, especially if he must make very soft castings, but he does mean to have it understood that if the foundryman specifies the correct silicon, sulphur, and total carbon, with possibly Manganese desired, that he can safely ignore the appearance of the fracture, and stoutly refuse to pay a higher price for an iron of the composition he desires, because it happens to have a No. 1 fracture.

Among the advantages claimed for machine-cast iron, some have made the statement that the appearance of the fracture of machine-cast iron is a safer indication of its quality than with sand-cast iron. The value to the furnaceman of the chill cup test, used at some furnaces as an indication of the sulphur and silicon contents of the pig, is cited in illustration of the above statement. The speaker thinks, however, that it will be found in actual practice that the fracture of machine-cast pig iron, especially from different furnaces, is an unsafe guide, and should not be depended upon by the foundryman as a substitute for the chemical analysis. The size and shape of the molds used in different makes of casting machines, and the different methods used for cooling the hot iron by water, will probably make it impossible to compare the fractures of machine-cast iron from different furnaces.

(Mr. Colby exhibited samples of different kinds of machine-cast pig iron, and called attention to the marked influence of manganese on the appearance of the fracture of low phosphorus, Bessemer, basic, mill and foundry irons.—Ed.)

Fourth—The fourth objection which the speaker has heard made about machine-cast iron, is the difficulty in drilling the pigs for analysis. This brings up the general question of how to sample pig iron, to which important matter I will ask your attention in concluding my remarks.

Sampling Pig Iron for Analysis.

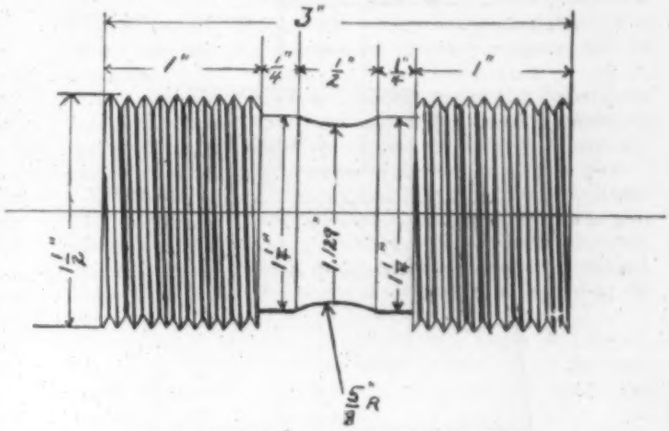
With the more general incorporation of chemical specifications in contracts governing the sale of pig iron for all purposes, the question of how to determine whether the shipper has lived up to his contract becomes more important.

If seller's and buyer's chemists do not agree, the first step should be an exchange of samples to check accuracy of analytical methods; in some cases the service of a reference chemist will be required. Such a test is only just when the sample drillings are ground and thoroughly mixed, and when a sufficient quantity for duplicate analysis, is distributed to each chemist.

Marked differences between the furnace analysis, on which the casts of pig iron are selected for shipment on a certain contract, and the report of the buyer's chemist on the cars of iron received will more often be due to *improper sampling* of the iron, than to inaccurate analytical work. Everyone knows of the unavoidable variations in the chemical composition of different parts of a cast of sand-cast pig iron, or for that matter in different parts of a single sand-cut.

The furnaceman must consider *each cast of iron as a unit*, and should spare no pains or expense to obtain a sample representing the true *average* of the cast. He cannot honestly claim to have done this unless he has taken four or preferably six samples of the molten metal during casting: when the casting machine is used the sampling can best be done as the large ladles of iron are being emptied into the molds, by filling a small test ladle at stated intervals. If the contents of these test ladles is cast into small ingots, the sample analyzed should consist of an equal quantity of drillings from each of the four or six ingots; if each small ladleful is poured into water, the same number of shot from each sample should be pounded together to make the average sample of the cast. In filling an order the furnaceman must consider *each cast as a unit*, and select those casts for shipment, the furnace analysis of which fall within the customer's specification. As cars vary in size and as the railroads always insist on having them loaded to nearly their full capacity, it is impossible to ship each cast of pig iron separately, for it may weigh less but more often considerably over the capacity of the car; the best the furnaceman can do, therefore, is to load casts of similar silicon and sulphur contents on the same car.

It is obvious that the customer's chemist when sampling the iron must consider *each car load as a unit*, and from what has been said it would be manifestly unfair for him to condemn a car of iron on the analysis of drillings from only two or three pigs. A good routine method of sampling consists in selecting two pigs from the surface of the carload of iron at points equally distant from each end of the car, and two more pigs from the bottom of the car, preferably at different distances from the end of the car. These pigs should be broken and drilled in the fracture, preferably by the use of a wide angle blunt pointed drill, two to three inches in diameter, using rather a slow feed so as to obtain uniformly fine drillings. If this requires a larger drilling machine, or more power than can be assigned to the task, a number of holes may be drilled in the face of each pig, using a smaller drill.



U. S. STANDARD SPECIMEN FOR CAST IRON.

If the analysis of an equal portion of carefully mixed drillings from each of these four pig shows a wide variation from the chemical specification under which the iron is purchased, the car of iron should not be condemned by the customer without taking a more thorough sample consisting of a dozen or better, twenty pigs, selected from different parts of the car. The pigs should be selected arbitrarily and no attention paid to the fracture. With sand-cast iron, sold on a guarantee of .050 sulphur, a customer could unfairly condemn many cars shipped by selecting only the pigs showing the closest-grained fracture, and by taking drillings for analysis, with a small drill, in the top part of each pig.

Sampling Machine Cast Pig Iron.

When the iron is machine-cast the *proper* sampling of each car is a laborious undertaking. If low in silicon the iron is so deeply chilled that the pigs can only be drilled in the center, if at all; the presence of 1.00% to 2.00% of manganese also renders machine-cast iron very hard to drill. When impossible to drill, the reduction of chips of the chilled iron to a powder in a steel mortar is a slow operation, unless the laboratory is unusually well equipped for such work. The attached illustration shows a very convenient form of steel mortar and pestle with which samples of chilled iron can be quickly pulverized.

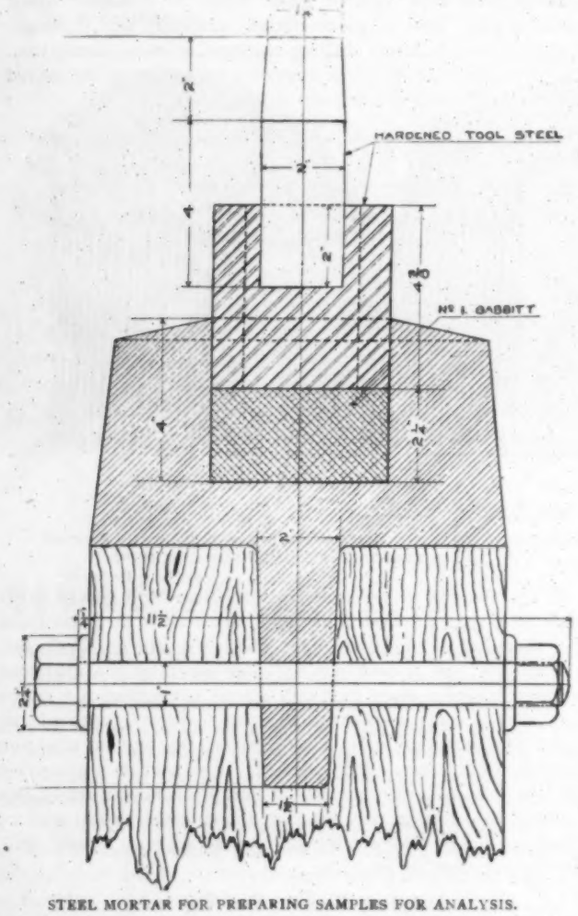
Without for a moment denying the right of the buyer to check the furnaceman's analysis, the speaker believes the furnaceman has a much better opportunity of determining, by conscientious sampling, the true average composition of each cast of iron, and he ventures to predict that, with the more

general introduction of machine-cast iron, the customer will purchase iron from furnaces where proper care is used in sampling, and then rely, with only an occasional check on the furnace analysis of the casts loaded on each car, which information should be given on cards tacked on the inside of each car, and also by postal card advices of each day's shipment from the furnace.

This suggestion does not apply to the closer inspection necessary in some cases if the customer suspects that the furnaceman is shipping a little of his "Misfit" iron on the bottom of each car of pig iron guaranteed as "Standard." This dishonest practice, unfortunately carried on to some extent, is sure of detection sooner or later, and is sure to react seriously on the reputation of this furnaceman's iron in the trade.

If several cars of the same iron are to be placed in one pile in order to equalize the difference in the chemical composition of the carloads, the first car unloaded should be distributed horizontally and evenly throughout the length of the proposed pile, the second carload similarly on top of this, and so on. Then by using vertically downward from one end of the pile, iron will be obtained which will conform very closely to the average analysis of the drillings from each car.

The greatest advantage which will result by the general introduction on the market of machine-cast foundry pig iron, in the speaker's opinion, is that it will tend to hasten the day



STEEL MORTAR FOR PREPARING SAMPLES FOR ANALYSIS.

when foundry pig iron will no longer be sold by grade, based on the appearance of the fracture, but will vary in price according to its chemical analysis, which is fair alike to producer and consumer.

The Phoenix Iron Works Co., of Meadville, Pa., have found their business increasing to such an extent as to necessitate the enlargement of their facilities. A contract has been given to the Penn Bridge Co., of Beaver Falls, Pa., for the structural work of a new boiler shop, which will more than double their present capacity. The new shop will be equipped with the most approved modern machinery, and thoroughly up to date. They are also building an addition to their foundry, which will give a large increase in capacity. The capacity of the engine department is also to be increased.

THE MANUFACTURERS' ASSOCIATION.

The Executive Committee of the National Association of Manufacturers' recently held a meeting at Philadelphia, and decided to call a national reciprocity convention at a date to be named later. In pursuance of this decision the committee adopted the following resolution:

"Resolved, For purposes of clear comprehension and expression of public sentiment respecting the reciprocal and trade relations with foreign powers.

"That this committee deems it expedient that there be held under the auspices of the National Association of Manufacturers a national conference on reciprocity;

"That the duty of arranging for such a conference in all its details be and is hereby assigned to the officers of the association (the president, treasurer, secretary and general manager), who are authorized to associate with themselves such members of the association as they may deem desirable in the formation of a general committee of arrangements, which committee shall share with the officers the duties and responsibilities attached. To designate time and place of meeting. To arrange and limit the constituency of the conference. To make all arrangements for order of business, program and such other details as may be necessary to make such conference a success."

The meeting was held in the offices of Theodore C. Search, the president. The members of the committtee present were: President Theodore C. Search, Philadelphia Pa.; Treasurer Charles A. Schieren, New York; Secretary E. P. Wilson, Cincinnati, O.; Daniel C. Ripley, Pittsburg, Pa.; Richard Young, New York City; P. E. Montanus, Springfield, O.; George T. Coppins, Boston, Mass.; John H. Converse, Philadelphia, Pa.; Robert Laidlaw, Cincinnati, O.; Ludwig Nissen, New York; William McCarroll, New York; D. A. Tompkins, Charlotte, N. C.

At this session the following resolution, offered by D. A. Tompkins of Charlotte, N. C., was adopted:

"Whereas, It is of the utmost importance to the people of Cuba that they be brought to understand the good intentions of the United States in its efforts to accomplish pacification of the island and to bring about the conditions necessary for closer commercial and social intercourse between Cuba and the United States; therefore, be it

"Resolved, We heartily recognize the benefit of the action of the United States government in transporting to the United States a thousand Cuban teachers to inspect and study the educational systems of this country with a view to extending the American system in Cuba.

"We recommend to the government a similar move among the merchants of Cuba, to inspect and study the industrial and trade conditions in the United States. We respectfully suggest that in order to afford to Cuban merchants the best and quickest opportunity to become familiar with conditions favorable to an increase of social and commercial intercourse between the island of Cuba and the United States, that the government repeat for the merchants what it did for the teachers, and bring a party of Cuban merchants to Charlestown to the exposition and on a visit to some of the other trade centers of the country, and also to Washington."

Secretary E. P. Wilson is reported as saying that: "Charleston, Buffalo, Cincinnati and Washington have been mentioned for the meeting, and it will probably be held in one of these cities. The date of the meeting will be, I believe, some time in October."

The Cleveland Pneumatic Tool Co. has opened a Chicago office at No. 335 Wabash avenue, in charge of H. S. Covey, where samples of their complete line of chipping, beading and caulking hammers; the "Cleveland" long stroke riveting hammers, piston, rotary and breast drills may be seen.

The American Can Co. is considering the matter of removing the Astoria, Ore., can plant to Portland, Ore. If the move is not made the plant will be enlarged in its present location.

The first channels rolled in the south have just been made by the Southern Car & Foundry Co. at its Anniston, Ala., plant, the product being 10-inch channels for car truck construction.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market and Some of their Wants:—

The Abendroth & Root Mfg. Co. of Brooklyn, N. Y., has purchased the plant of the Wright Engine Co. at Newburgh, N. Y., and will immediately equip the buildings with all necessary machinery for operating a modern foundry.

Pittsburg parties have made a proposition to the citizens of Myersdale, Pa., that if a bonus of $15,000 is secured they will erect a tin plate plant in their city. Efforts are being made to secure the bonus.

The Elizabeth Brass Foundry Co. of Elizabeth, N. J., has been incorporated with a capital of $50,000. C. C. Bussey, C. M. Whitney and J. T. Hague are the incorporators.

The Whiteley rolling mill, at Springfield, O., has been purchased by the Victor Rubber Tire Co. Channels for rubber tires for vehicles will be the main output of the plant in the future. Considerable work must be done repairing the plant, however, before operations can be commenced.

Christopher Bros.' blacksmith and machine shop at Gadsden, Ala., has been purchased by the proprietors of the Gadsden, Attalla & Alabama City Car Line Co. The new company will manufacture car wheels, supplies for coal mines, cotton mills and furnaces.

Fires and Accidents:—

The plant of the Lehigh Foundry Co. at Fullerton, Pa., was destroyed by fire last week. The loss is estimated at $50,000. The foundry will be immediately rebuilt.

New Construction:—

The Pennsylvania Steel Co., Steelton, Pa., will build a reservoir in the old canal basin adjoining its plant to provide water for the entire works. A large pumping station will also be erected.

The Phoenix Boiler Works, Meadville, Pa., will erect a new boiler shop, 75 x 300 feet. This will practically double the capacity of the plant. When the new addition is in operation the company will have an output of 1,500 boilers annually.

The Malleable Iron Works, Bridgeport, Ct., will erect six new buildings. The addition to the foundry building will be 65 feet in length, while the new pattern shop will be two stories high and 31 x 41 feet in dimension. The other buildings will be used for shipping and warehouse purposes.

It is reported from Paducah, Ky., that George W. Dixon will next month begin the erection of a charcoal furnace near the town, to use local ores.

The J. M. Kohler Sons' Co., Sheboygan, Wis., is about to rebuild its plant at Riverside. The Modern Steel Structural Co., Waukesha, Wis. has the contract for the buildings. The enameling department will be the largest in the state.

The Grand Rapids, Holland & Lake Michigan Railway Co. will enlarge its facilities at Holland by erecting an addition to the machine shop and a 65x100 foot addition to the car barns.

The contract for the erection of a machine shop, engine and boiler house for the Western Machine Tool Works, at Holland, Mich., has been awarded to Rothschofer Bros. The equipment will include a 50-h. p. boiler and a 60-h. p. engine.

The Iowa Grinder & Steamer Co., Waterloo, Ia., will erect a two-story factory building 80x200 feet.

A. T. Nye & Sons Co., of Marietta, O., is building a three-story brick addition, 40x120 feet.

The United Engineering & Mfg. Co. has been awarded a contract for constructing a 12-inch and an 18-inch mill for the New Castle Iron & Steel Co., of New Castle, Pa. This company was recently organized with a capital stock of $1,500,00.

The Prizer-Painter Stove & Heater Co. has awarded a contract for a one-story brick and iron addition to its plant.

The Peninsula Foundry Co. is reported as intending to build a new plant at Newport News, Va.

The South Chester Tube Co., South Chester, Pa., which manufactures steam and line pipe, tubing and casing of all kinds, has recently added equipment to its plant for the manufacture of 12-inch pipe.

The Ravenna Boiler Co., whose works at Ravenna, O., were recently destroyed by fire, has concluded to rebuild on a larger scale. It is expected that the new plant will be ready for operation by the first of the year.

The Sargent Co., of Chicago, is finding such a demand for its steel castings that it is contemplating additions to its plant at Chicago Heights.

The Seiberling & Miller Co., Doylestown, O., is erecting a new plant for the manufacture of harvesting and other agricultural machinery. The main building will be three stories high, 50x150 feet. The first floor will be used as an erecting department, on the second will be located the pattern shop and testing department, and on the third floor the paint shop. A foundry 60x110 feet is also being built, together with an engine house 50x50 feet, and a warehouse 36x120, two stories high.

The New Castle Stamping Co. is having plans prepared for a new plant at New Castle, Pa. An enameling room 80x300 feet, a machine shop 80x206 feet, a pickling house 50x75 feet and some small buildings are contemplated.

The Columbia Enameling & Stamping Co., of Terre Haute, Ind., is building a new plant in that city at a cost of about $200,000.

The Pittsburg District:—

The Pittsburg Seamless Tube Co. has been organized for the purpose of purchasing the plant of the Atlantic Tube Co., near Beaver Falls, Pa. The plant, good will and patents owned and controlled by the latter concern will be sold to the highest bidder on Oct. 26. The Pittsburg Seamless Tube Co. has been organized for the purpose of acquiring the property, and if it is successful the plant will be greatly increased in size and the output will be practically doubled. It is stated that the capital stock of the new company will be $1,000,000.

At a meeting of the board of directors of the Parkersburg Iron & Steel Co. of Parkersburg, W. Va., held in Pittsburg last week it was decided to increase the sheet plant now under construction from a four-mill plant to a six-mill plant.

At the annual meeting of the Pittsburg Stove & Range Co., held in Pittsburg last week John D. Nicholson was elected president to succeed Charles H. Bradley. The composition of the board of directors was practically unchanged, except that J. W. Huntley was elected on the board in the place of L. W. DeHaven, resigned.

The American Coke Co. has fired 150 ovens at Lambert, Pa., in the Masontown coke field. About 200 of the company's ovens are completed and 300 others are under construction.

The Carnegie Sheet Iron Co. of Pittsburg, Pa., has been incorporated with a capital of $1,000. A plant is to be erected at West Carnegie, Pa. R. G. Gillespie, W. H. Skivington, D. R. Torrance, J. H. Paul and T. R. Everson are the incorporators.

The Anchor rolling mill plant on the South Side is now being operated by Neal Bros. of this city. The sheet mills are operating in full.

The McClintic-Marshall Construction Co. of Pittsburg and Pottstown, Pa., has been awarded the contract for the erection of a large addition to the plant of the Pittsburg Reduction Co. at Niagara Falls, N. Y. The addition will practically double the capacity of the works. About 400 tons of structural steel will enter into the construction of the building.

The Pope Tin Plate Co., recently organized in Pittsburg with a capital of $500,000, will erect a 12-mill tin plate plant at Steubenville, O. Contracts for the erection of the mill buildings have already been placed. The main building containing the hot mills, will be 380 feet long and 80 feet wide. Another building will be 360 x 40 feet, a third 300 x 75 feet, and a fourth 180 x 25 feet. It is the intention to construct the plant so that 12 additional mills can be added either tin or sheet. The offices of the company are at 421 Wood street, C. E. Pope being the promoter of the company.

The West and Northwest:—

The Iowa Iron & Steel Co., 1216 Holland Building, St. Louis, Mo., has been incorporated with a capital of $1,000,000 to absorb the Waukon Iron Co. of Waukon, Iowa, who own large brown hematite ore desposits at the latter place and

whose plant has a capacity of 30 tons of ore per hour. The company has secured the transfer of one furnace with a capacity of 400 tons daily on the river banks of the Mississippi, near St. Louis, and it is probable that another furnace will be built adjoining the present one, for the production of charcoal iron.

The McCormick Harvester Co., Chicago, Ill., will erect an addition to their plant five stories high, 200 feet long and 150 feet wide. The building will cost $175,000.

It is reported that there is a plan to start in operation the old plant at Duluth, Minn., built by the Ironton Structural Steel Co. and now belonging to the bankrupt estate of John E. Searles, and the West Superior (Wis.) plant. The former plant has an open-hearth furnace and two trains of rolls making structural material. Most of the machinery in the latter plant has been removed. The plant originally contained two 4-ton converters and two trains of rolls.

It is understood the Republic Iron & Steel Co. has under advisement the enlargement of its Maumee plant at Toledo, O. The foundations of the sheet and plate mills, which were removed, may be utilized for new mills.

The Central Edge Tool Works, Jonesboro, Ind., erected by Rogers & Son of England, are completed and will be put in operation the middle of this month.

The Western Rawhide & Belting Co.'s plant at Hammond, Ind., will be removed to Milwaukee, Wis., where a factory building, 150x158, will be erected.

The Vilter Mfg. Co., Milwaukee, Wis., has taken out permits for additions to its plant, as follows: Brick and stone foundry, 110x280 feet, to cost $25,000; boiler house, 48x110 feet, two stories high, to cost $4,000; carpenter shop, 44x144, two stories high, to cost $3,000.

The Tarrant Foundry Co., 46 Indiana St., Chicago, has leased the plant at Aurora, Ill., formerly occupied by the Hercules Ice Machine Co., and will put 50 molders at work there. It has closed its Chicago plant and will not start it until after the molders' strike in that city has been settled.

The Cleveland Pneumatic Tool Co., Cleveland, O., has opened an office in Chicago at 335 Wabash Ave., which is in charge of H. S. Covey.

Rock River Machine Co., Janesville, Wis., has just completed a large power machine for the Randolph Wagon Works, Randolph, Wis., also one for a firm at St. Johns, N. F. The company reports it is running with full force on hand and power punches, shears and emery grinders, and that it is compelled to add new machinery right along in order to keep up with its growing trade.

For the better conduct of its business, the English Supply & Engine Co., Kansas City, Mo., has separated its foundry and machine shop from its regular business and organized two distinct concerns, viz.: "The English Iron Works Co.," devoted to the manufacture of steam engines and boilers, and "The English Supply Co.," which will handle the same lines as heretofore and distribute the product of the English Iron Works Co. Both concerns will be conducted by C. C. and T. F. English.

The Waukesha Sheet Steel Co., Waukesha, Wis., reports that satisfactory progress is being made in the erection of its plant in that city. The mill, when completed, will have a capacity of one hundred tons per day of black and galvanized sheets.

The Murray Iron Works Co., Burlington, Ia., will soon have its new boiler shop completed, and the structural steel for the addition of its Corliss engine shop is on the ground. The company reports that orders continue plentiful and the prospects for business good.

General Industrial Notes:—

The Lambert Gas & Gasoline Engine Co., Anderson, Ind., has shipped ten car loads of portable gasoline engines for thrashing purposes, to Grand Forks, N. D., within the last two months. The engines were principally 16, 20 and 25-h. p.

The main buildings of the Girard Foundry & Machine Co., Girard, O., are completed and the machinery is now being installed. One large order has already been secured upon which work will be commenced shortly.

The annual meeting of the Marinette Iron Works Mfg. Co., Marinette, Wis., was held last week. Directors were elected as follows: A. C. Merryman, W. O. Carpenter, R. H. Trumbull, A. L. Hamilton and T. C. Miller. The directors elected the following officers: T. C. Miller, president; A. C. Merryman, vice-president, and A. L. Hamilton, secretary and treasurer. It was decided to erect a producer gas plant immediately.

The Erie Iron Works, The Skinner Engine Co. and the Union Iron Works, all Pennsylvania corporations, last week filed a petition in the United States Court at Baltimore, Md., asking that Morton, Reed & Co., machinists and dealers in railroad supplies, be declared bankrupt. The liabilities of the company are placed at $60,000, while the assets are estimated at $59,000.

The Cahill Iron Works, Chattanooga, Tenn., has just completed a two-story warehouse and finishing department. The foundry building is also to be torn down soon and will be replaced by a larger and more modern structure.

The National Enameling & Stamping Co. of St. Louis, Mo., has filed a mortgage for $2,500,000 in Illinois in favor of the St. Louis Trust Co.

The Waynesburg Pressed Steel Co. has just placed its new shovel plant, located at Waynesburg, Pa., in operation, and are manufacturing a full line of plain and hollow-back shovels. The capacity of the plant is 200 dozens daily. In addition the plant has a large output of drop forgings, railway forgings, elevator buckets and pressed steel specialties. The main building is 100 x 150 feet. The officers of the company are as follows: R. W. Munnell, president; S. H. Hooper, treasurer; J. W. Munnell, secretary; W. D. Forsyth, general manager.

The town of South Sharon, Pa., where the mills and furnace of the Sharon Steel Co. are located, has made application to the court for incorporation as a borough. The city of Sharon, Pa., adjoining South Sharon, however, proposes to annex this district and a hot fight is promised in court.

Arguments in the exceptions filed in the suit of L. S. Hoyt against the Shenango Valley Steel corporation, William Patterson, William E. Reis, John Stevenson, Jr., George B. Berger and James McClane were heard in court at New Castle, Pa., last week. The suit was brought by L. S. Hoyt against the Shanango Valley Steel Co. for his share of an increase of the capital stock of the company as one of its original stockholders. In 1898 the company increased its capital stock from $1,000,000 to $2,500,000. The board of directors sent letters to the stockholders offering them an opportunity of subscribing for the additional issue of stock. After the subscription books had closed it was found that 1,757 shares were not subscribed for and these were taken by the members of the board. Mr. Hoyt claims that the letters sent out by the directors offered only half the increased stock to the stockholders, and that the other half was never offered. When the plant operated by the company was sold to the National Steel Co. in addition to receiving one share of common and one of preferred the stockholders were each offered and paid $120 cash for each share of stock they held. The court decided in favor of the defendants but efforts are being made to secure a new trial.

Two hundred men employed at the plant of the Avonmore Foundry & Machine Co., Avonmore, Pa., went on a strike last week for an increase of 10 per cent in their wages.

The foundry of Humphrey & Son, Joliet, Ill., recently destroyed by fire, is being rebuilt. The plant will be 15 per cent larger than the one destroyed.

At Ofoten, in northern Norway, arangements have been concluded for erecting an Edison magnetic ore concentrating plant, using local water power. A railway will shortly be completed to carry ore from Gellivara down to Ofoten, whence the concentrates will be shipped to England. A return cargo of coke is expected in the vessels ultimately, by which pig iron will be made at Ofoten.

The Erie City Boiler & Engine Works, Erie, Pa., report sales of 4,200-h. p. water-tube boiler plant to the Kokomo Steel & Wire Co., Kokomo Ind., 500-h. p. to the J. C. Roth Packing Co., Cincinnati; 300-h. p. to the Procter & Gamble Co., Cincinnati and 150-h. p. to the King Bridge Co., Akron, O., 500-h. p. to Wheeling & Lake Erie R. R., as well as a number of smaller equipments.

The work of repairing the two blast furnaces located at Grand Rivers, Ky., is progressing rapidly, and according to present indications the two furnaces will be ready to blow in within two months.

COCHRANE HEATERS.

The **Cochrane Heaters** are of generous proportions, giving sufficient space for the free passage of the steam through the heater, without lifting water, and without creating any back pressure; they are also of sufficient water carrying capacity to permit a very slow travel of the water through the filtering material to the pump suction opening. To the water temporarily carried no further heat is applied, all of the heating having been accomplished before the water dropped into the quiet pool carried in the bottom of the heater.

If you are interested in the subject of feed-water heaters, we would be glad to hear from you.

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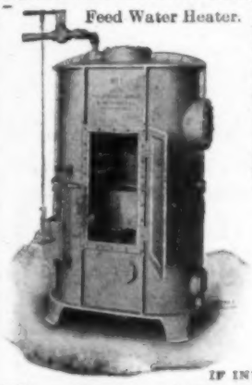
In addition to our already large line, we are prepared to furnish 20-in. and 36-in. Engine Lathes. The 36-in. Lathe is made either back or triple geared. Both these tools are of new design and contain many new and valuable features not found in lathes of other makes.

If you are interested, we will be glad to furnish full particulars.

SCHUMACHER & BOYE, Cincinnati, Ohio.

Feed Water Heater.



Feed Water Heaters

Cut herewith illustrates Stilwell's latest design. **Made entirely of cast iron.** Saves fuel and filters the feed water for steam boilers. Use only exhaust steam.

BOILER FEED PUMPS

Single, Duplex and Triplex.

AIR COMPRESSORS

Jet - Condensers - Surface

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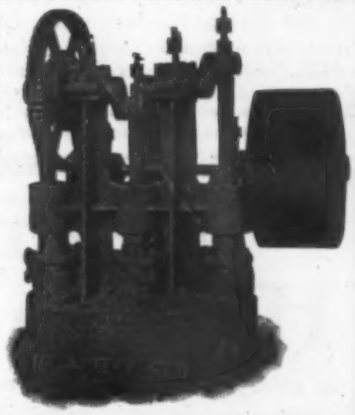
The Stilwell-Bierce & Smith-Vaile Co., 227 Lehman Street, DAYTON, OHIO, U. S. A.



Triplex Boiler Feed Pump.

Keep Your Men Posted!

Let them learn how others turn out work. Give them a chance to keep informed.

THE FOUNDRY publishes from month to month a history of what is taking place in the foundry business. It shows new methods and new appliances

THE FOUNDRY believes that those who are making castings today are interested more in what has been accomplished than what it is possible to do, therefore its columns are kept free from too theoretical problems, and actual practice instead is illustrated.

The following are the contents of a recent issue of **The Foundry:**

Trade Outlook.
A Modern Foundry. Illustrated.
Convention of A. F. A.
Kranks' Korner.
A Cheek Without Bars or Gaggers. Illustrated. Richard Barnett.
Repeat Castings. Illustrated. George Buchanan.
Name Plates. Edmund S. Sperry.
Newten Cupola. Illustrated.
Sly Water Mill Illustrated.
Construction and Management of Cupolas. Thos. D. West.
What Will Make Iron Wear? W. Osborne.
Good Thing for Bench Molders. Illustrated.
Why Foundries Lack Competent Foremen. Wm. H. King.
Anthracite Coal as Cupola Fuel. T. F. Stimpson.
Delano Pulley Molding Machine. Illustrated.
Among the Foundries.
Air Furnace Metal
Chimmie Powers' Answers.
Cast Iron Car Wheels. William Fawcett.
Cast Iron Notes. W. J. Keep.
Cone Pulley Pattern. E. Kemmerle.
Newton Disaster. A. C. Miller.
Foundry Practice. Ed. B. Gilmour.
Hardening Copper.
Trials of a Foundry Foreman. C. Vickers.
What the Molder Has to Do. L. C. Jewett.

Give the men in your foundry this much information every month, and will they not be able to do their work better? They will, and **you** should see that they get *The Foundry* regularly. It costs but A DOLLAR A YEAR, and lots of firms subscribe for their men.

The Foundry, Rose Bldg., CLEVELAND, O.

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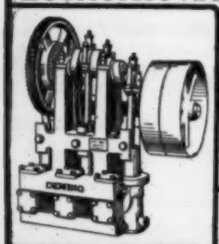

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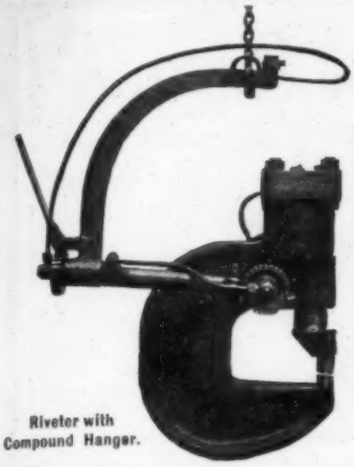

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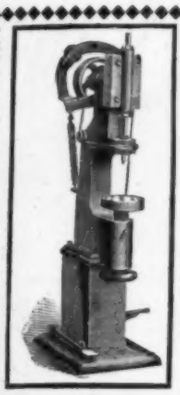

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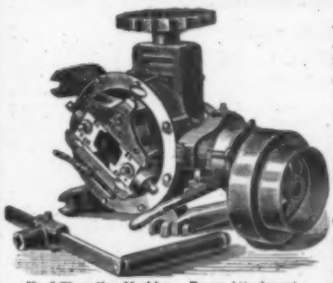

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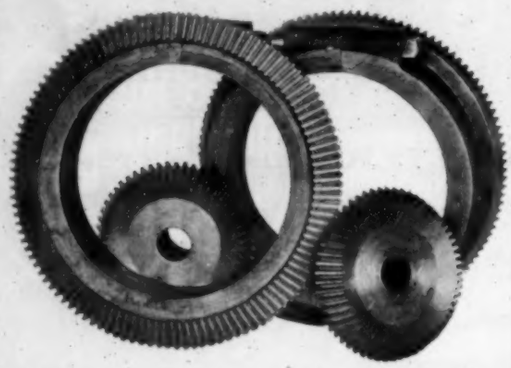

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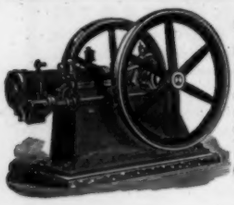

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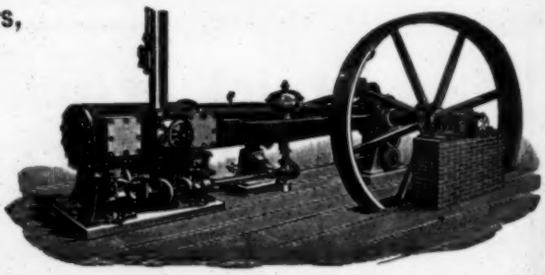

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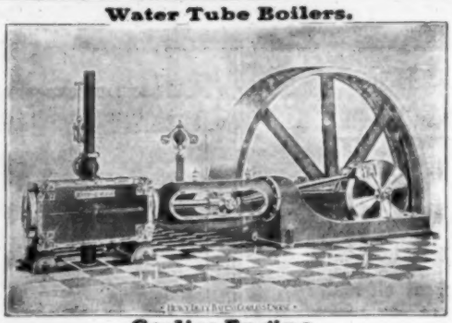

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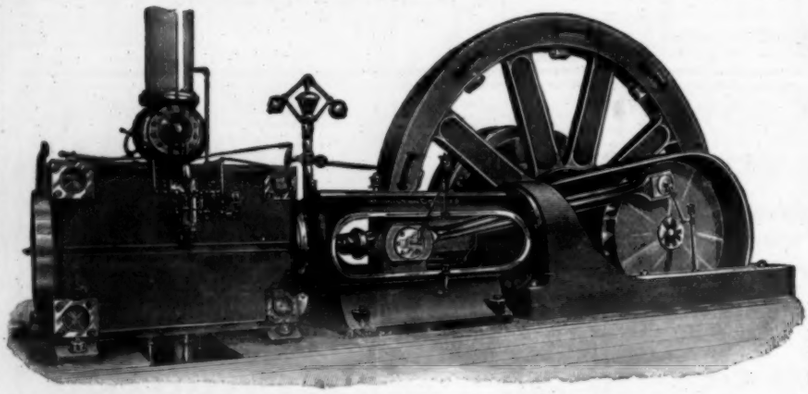

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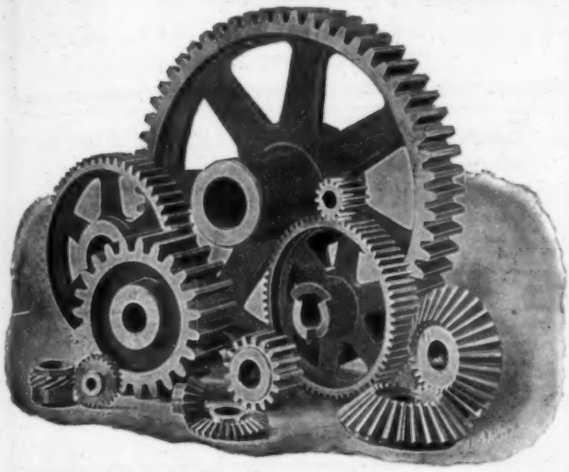

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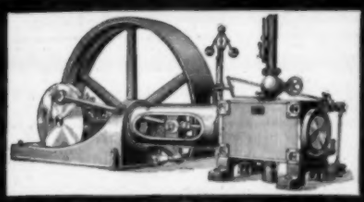

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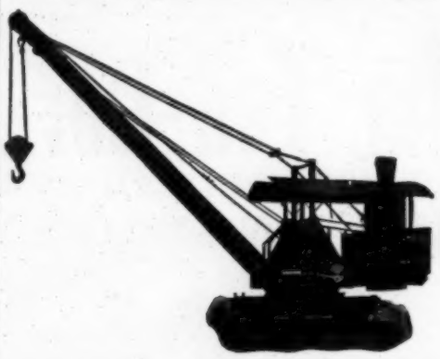

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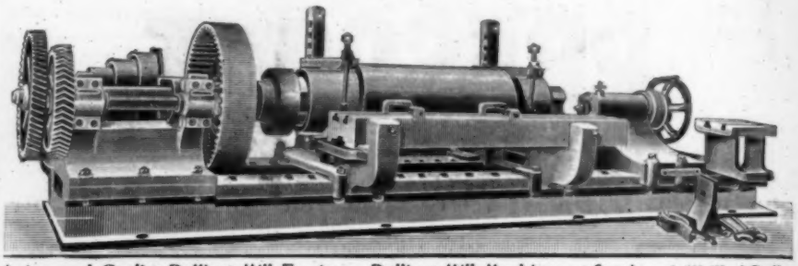

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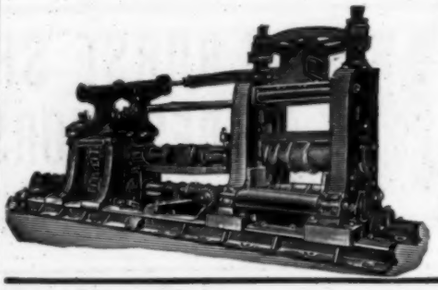

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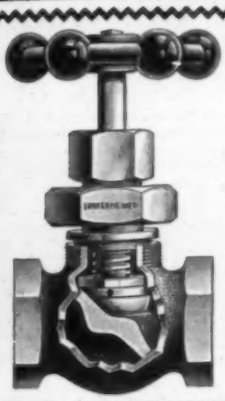

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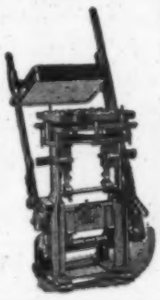

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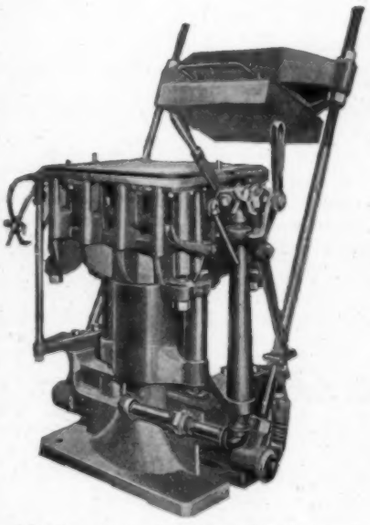

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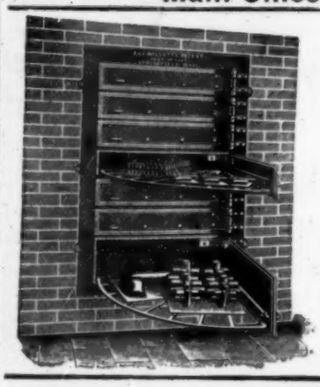

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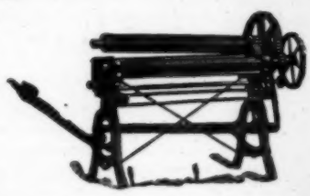

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